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EXAMINER	
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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Paper No. 45

Application Number: 08/889,440
Filing Date: July 08, 1997
Appellant(s): TAKEUCHI ET AL.

Matthew Q. Ammon
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 10/20/2003.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) Status of Claims

The statement of the status of the claims contained in the brief is substantially correct.

However, Appellant's brief presents arguments relating to whether Appellants "have a correct copy" of the applied art. This issue relates to petitionable subject matter under 37 CFR 1.181 and not to appealable subject matter. See MPEP § 1002 and § 1201.

- Appellants state (footnote 1, page 2, Appeal Brief) that:

> "Applicants note that they may not have a correct copy of the Kinema/SIM reference in their possession. Applicants have requested that the examiner mail a copy of the same to Applicants, but as of the filing of this Appeal Brief, Applicants have not received the same."

The examiner is ***not sure why Appellants believe there is any "other version."*** Appellants are kindly requested to explain why they believe there is another version. Regardless, the Examiner took time from a busy schedule to check, as requested. There is no "other version" of the reference. If Appellants have another version, they should submit it along with a proper Information Disclosure Statement and the Examiner will review it. The version sent to Appellants (6/18/1999 - paper # 9), and ***to which Appellants have responded to since 1999 in their various responses***, is the only and therefore "correct" version of the reference. ***There was nothing for the Examiner to send to Appellants***. Appellants have never previously indicated that they believed that there was any "other version". The Examiner told Appellants when they called, that he would look into the matter. Appellants did not follow up on their question and instead filed the Appeal Brief. There is simply no other version nor reason to believe that there is "another version". To somehow place blame on the Examiner for not supplying a non-existent "other version" of a reference, and where Appellants have not attempted to explain why they believe there is another version is, respectfully, placing undo burden on the Examiner, and not in the interests of compact prosecution. Appellant's statement appears to suggest that perhaps the Appeal Brief is premature.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Invention

The summary of invention contained in the brief is deficient because the first paragraph appears to be directed at arguments relating to alleged advantages of the invention. The second paragraph is, respectfully lacking in a showing of support for the claimed invention in the specification, as required by the MPEP.

In particular, the summary of invention contained in the brief is deficient because the brief does not contain a concise explanation of the invention ***defined in the claims*** involved in the appeal, ***which refers to the specification by page and line number***, and to the drawing, if any, by reference characters as required by 37 CFR 1.192(c)(5). Appellants have provided an exposition of the invention, which is not reflected in the claims, and has not specifically indicated where the *claim limitations* are supported in the specification. This is relevant because the claims have been finally rejected under 112.

Appellants have not specifically mapped the claims to the "*Summary of the Invention*". MPEP section 1200 recites, in part:

> "Summary of Invention. A concise explanation of the invention defined in the claims involved in the appeal. This explanation is required to refer to the specification by page and line number, and, if there is a drawing, to the drawing by reference characters. Where applicable, ***it is preferable to read the appealed claims on the specification and any drawing***. While reference to page and line number of the specification may require somewhat more detail than simply summarizing the

invention, ***it is considered important to enable the Board to more quickly determine where the claimed subject matter is described in the application.***"

(6) Issues

Appellant's brief presents arguments relating to whether Appellants have complied with the requirements of 37 C.F.R. 1.56. This issue relates to petitionable subject matter under 37 CFR 1.181 and not to appealable subject matter. See MPEP § 1002 and § 1201.

The 112(1) rejections relating to "chemical composition" and "physical condition" have been withdrawn in response to Appellants showing of support in the specification (pp. 9-10, Appeal Brief).

(7) Grouping of Claims

The rejection of claims 1, 3-9, 11-20, 22-31 stand or fall together because appellant's brief does not include a statement that this grouping of claims does not stand or fall together and reasons in support thereof. See 37 CFR 1.192(c)(7). In fact, *Appellants have not argued the merits of the prior art rejections,* instead, alleging that the rejections were not proper.

(8) Claims Appealed

The copy of the appealed claims contained in the Appendix to the brief is correct.

(9) Prior Art of Record

5,421,934 Misaka et al. 6-1995

Ohira et al. "Molecular-Dynamics simulations of hydrogenated amorphoud silicon thin-film growth." (Pp. 1-6; 11/1995 – presented at the Materials Research Society – Appellants' IDS – paper # 5).

Baumann et al. "3D Modeling of sputter and reflow processes for interconnect metals." IEEE IEDM; pp. 4.4.1-4.4.4; 1995.

Yamada et al. "A sputter equipment simulation system including molecular dynamic target atom scattering model." IEEE IEDM; pp. 4.5.1-4.5.4; 1995.

Husinsky et al."Fundamental aspects of SNMS for thin film characterizations : Experimental studies and computer simulations." Thin Solid Films; pp. 289-309; 1/1996.

Kinema/Sim Manual; published by ArSciMed – 1996.

Reeves "Particle systems – a technique for modeling a class of fuzzy objects." ACM transactions on Graphics; pp. 91-108; 4/1983.

Cohen "Computer animations, quantum mechanics and elementary particles." Europhys.; pp. 163-166 ; 1992.

Jones et al. "Monte Carlo Investigation of Electron-Impact Ionization in Liquid Xenon." Physical review B; pp. 9382-9387; 1993. *This reference, authored by the Examiner, was provided in reference to Appellants' challege of Official Notice as well as inherency.*

(10) Grounds of Rejection

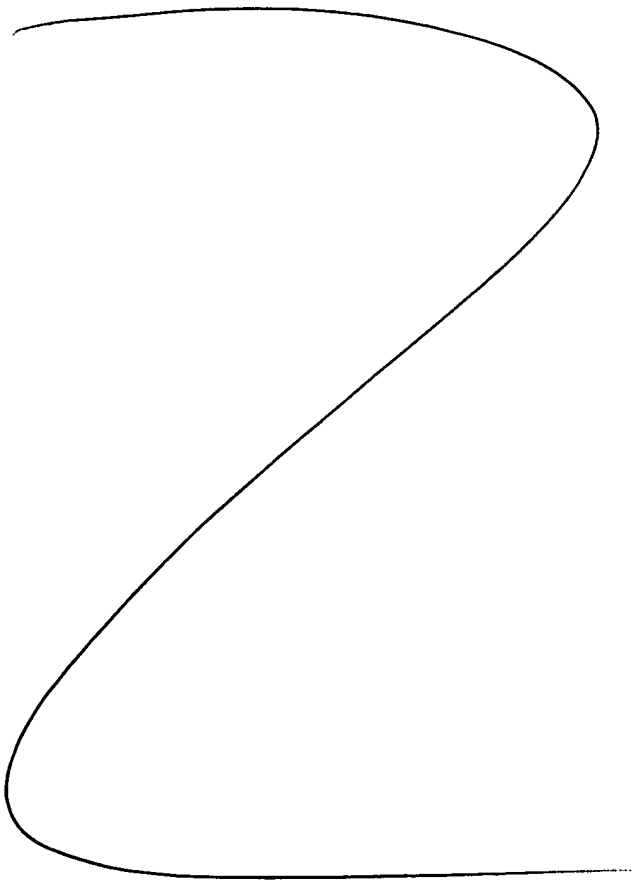
The following ground(s) of rejection are applicable to the appealed claims:

Claims 1, 3-9, 11-20, 22-31 are rejected under the following:

- **Claims 1, 3-9, 11-20 and 22-31 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.**
- **Claims 1, 3-9, 11-20 and 22-31 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.**
- **Claims 1, 16, 20, 23, 24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention.**
- **Claims 1, 3-9, 11-20, 22-31 are rejected under 35 U.S. C. 103 (a) as being unpatentable over (Misaka et al. *or* Baumann et al.) in view of the Examiner's own experience and the taking of Official Notice.**

- **Claims 1, 3-9, 11-20, 22-26 and 28-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over (Yamada et al. *or* Misaka et al. *or* Baumann et al. *or* Husinsky et al.) in view of (Kinema/SIM or Reeves or Cohen).**
- **Claims 1, 3-9, 11-20 and 22-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over [Ohira et al. (Applicant - Applicant's IDS).] in view of (Kinema/SIM *or* Reeves *or* Cohen).**

For convenience and compactness, the actual rejections are repeated in the appendix, following the response to arguments.



(11) Response to Argument

(11a) Response to Argument – Allegations of improper Examination or improper attitude

A few introductory remarks are first presented. These remarks relate to various themes relating to general allegations of an improper examination that Appellants have attempted to develop in the Appeal Brief and which are interleaved throughout the Appeal Brief. The Examiner apologizes for identifying and addressing these allegations, but respectfully wishes to correct the impressions about the Examiner which Appellants are attempting to create.

1) Appellants state (footnote 1, page 2, Appeal Brief) that:

> "Applicants note that they may not have a correct copy of the Kinema/SIM reference in their possession. Applicants have requested that the examiner mail a copy of the same to Applicants, but as of the filing of this Appeal Brief, Applicants have not received the same."

The examiner is ***not sure why Appellants believe there is any "other version."*** Appellants are kindly requested to explain why they believe there is another version. Regardless, the Examiner took time from a busy schedule to check, as requested. There is no "other version" of the reference. If Appellants have another version, they should submit it along with a proper Information Disclosure Statement and the Examiner will review it. The version sent to Appellants (6/18/1999 - paper # 9), and

to which Appellants have responded to since 1999 in their various responses, is the only and therefore "correct" version of the reference. ***There was nothing for the Examiner to send to Appellants***. Appellants have never previously indicated that they believed that there was any "other version". The Examiner told Appellants when they called, that he would look into the matter. Appellants did not follow up on their question and instead filed the Appeal Brief. There is simply no other version nor reason to believe that there is "another version". To somehow place blame on the Examiner for not supplying a non-existent "other version" of a reference, and where Appellants have not attempted to explain why they believe there is another version is, respectfully, placing undo burden on the Examiner, and not in the interests of compact prosecution. Appellant's statement appears to suggest that perhaps the Appeal Brief is premature.

2) The Examiner would also like to point out that he has conducted the examination of this application with *decorum* and *courtesy to the best of his ability* and that he has provided Appellants with all possible chances to present their arguments. The Examiner reminds Appellants of 37 CFR 1.3 ***(Business to be conducted with decorum and courtesy)***. Appellants have resorted to innuendo and speculation about the Examiner's intend with respect to the examination, including:

- that the Examiner intentionally delayed the prosecution of the application (lines 5-7, pg. 8, Appeal Brief). Please provide any evidence to support such an allegation or ***promptly withdraw such character attacks***.

- That the Examiner, "Seemingly on cue, the examiner once again repeated..." (see, for example, first full paragraph, pg. 7, Appeal Brief)
- That the Examiner somehow required Appellants to "appease" the Examiner (pg. 7, Appeal Brief).
- That Appellants had to submit code "in a last-ditch attempt to satisfy the examiner. Alas, in the April 18, 2003 Final Office Action, the Examiner dismissed the source code..." (see middle of pg. 7, Appeal Brief).
- That the Examiner after "appeasing" the Examiner with respect for the need to look at the code, refused to consider the code. The Examiner, in fact, considered the code and noted that many of the copyright dates were years after Appellant's filing date. The argument (pg. 8, Appeal Brief, for example) that they were the dates associated with the creation of the discs are not persuasive – as the Examiner has repeatedly informed Appellants. The discs were created in 2003. That is not the issue, as stated in paragraph 56, paper # 38 and paragraph 1, paper # 41. The Examiner reviewed the code. However, the Examiner maintained the 112 written description rejections because many of the dates indicated that the portions of code were written *years* after Appellants' filing date. For example, "TABLEM_CELL" lists creation and modification dates of 5/9/2001 and 10/31/2001, respectively. Appellants' filing date is July 8, 1997. In another example, "ewals3.F90" lists dates of 1/28/2002, 1/28/2002, 12/28/2002 on pages 2, page 4, page 6, respectively. Furthermore, there are also 1997 dates on this document, but

Appellants claim foreign priority back to 1996. The Examiner, respectfully, is not sure why Appellants feel the Examiner should reconsider the *Written Description Requirement* in light of code that was apparently created after Appellants' filing date. **Appellants are reminded that the rejection states that the claims are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.** *Printouts of some of those portions are included for the Board's review.*

"Apparently, the Examiner does not place much credence in the opinions of the Federal circuit..." (first full paragraph, page 14, Appeal Brief);

"Apparently, the Examiner is not aware ..." (top of page 14, Appeal Brief); Appellants have consistently mischaracterized the applied prior art throughout prosecution in spite of repeated attempts to correct the record:

Appellants' characterization throughout prosecution of the teachings of Baumann and Misaka trivializes and misstates their inventions – Appellants were repeatedly asked to refer to the detailed rejections as well as the teachings. For example, the characterization of the Baumann teaching as "...*incoming spheres* ..." again ignores the teaching of a simulation of Sputtering - *that which Appellants are attempting to claim.* ***Page 4.4.2 of Baumann discloses***

molecular dynamic simulation (simulation of trajectories). As per Misaka, see fig. 2; col. 9, line 65 to col. 10, line 9, wherein trajectories are discussed.

Appellants' continued characterization of the teaching of Reeves trivializes and mischaracterizes the invention - Please refer to the detailed rejections as well as the teachings. *For example, and Examiner would again like to point out - reference to "fuzzy" is irrelevant and has absolutely nothing to do with the issues at hand.* In fact, as repeatedly recited in the Official Office Actions: □Reeves discloses ***animation of particle behavior*** and discloses the concept of combined particle. For example, see page 91,

> *First, an object is represented not by a set of primitive surface elements, such as polygons or patches, that define its boundary, but as clouds of* ***primitive particles*** *that define its volume.*
>
> Section 2.1 discloses particle generation. Section 2.2 discloses:
>
> *For* ***each new particle generated****, the particle system must determine values for the following attributes:*
>
> *(1)* ***initial position,***
>
> *(2)* ***initial velocity (both speed and direction),***
>
> *(3) initial size,*
>
> *(4) initial color,*
>
> *(5) initial transparency,*
>
> *(6) shape,*
>
> *(7) lifetime.*

Section 2.3 discloses particle dynamics.

Please note the bold-faced portions - ***which define particle sources***.

The above examples taken from Appellants' Appeal Brief (and earlier reponses to art rejections) are, respectfully, uncalled for. The Examiner strongly objects to such allegations and speculation and the tone throughout the Appeal Brief. Appellants have attempted to make the Examiner's character an issue instead of the pertinent and *appealable* issues. The Examiner would also like to point out that he has conducted the examination of this application with *decorum* and *courtesy to the best of his ability* and that he has provided Appellants with all possible chances to present their arguments and reminds Appellants of 37 CFR 1.3 ***(Business to be conducted with decorum and courtesy***). ***The Examiner hopes that such discourteous language is withdrawn in any future communication to the Office.***

3) Appellants now allege that they claims were not properly rejected, but nevertheless conclude (pg. 17, Appeal Brief) "that claims 1, 3-9, 11-20 and 22-31 patentably distinguish over the cited references...". Appellants, respectfully, have not argued whether the claims patentably distinguish over the prior art of record.

In response to these statements and Applicants' statement that the art did not anticipate or *render obvious* the claimed invention and allegations that in someway the prior office action was defective in asserting of the prior art against the claims, Examiner can only respond by stating the Applicants are presumed to be at least one(s) of

ordinary skill in the art and therefore should understand the prior art teachings as they apply to the claims at hand. The 103 rejections, for example, were intentionally structured to recite *obvious*.

MPEP explicitly states: A **prima facie** case of unpatentability is established when the information compels a conclusion that a claim is **unpatentable under the preponderance of evidence**, burden-of-proof standard, giving each term in the claim its **broadest reasonable construction consistent with the specification**, and before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability. An application should not be allowed, unless and until issues pertinent to patentability have been raised and resolved in the course of examination and prosecution, since otherwise the resultant patent would not justify the statutory presumption of validity (35 U.S.C. 282), nor would it strictly adhere to the requirements laid down by Congress in the 1952 Act as interpreted by the Supreme Court. The **standard** to be applied in all cases is the **preponderance of the evidence** test. In other words, **an examiner should reject a claim if, in view of the prior art and evidence of record, it is more likely than not that the claim is unpatentable**. In rejecting claims for want of novelty or for obviousness, the **examiner must cite the best references at his or her command**. When a reference is *complex* or shows or describes inventions other than that claimed by the applicant, the particular part relied on must be designated as nearly as practicable. The pertinence of each reference, ***if not apparent***, must be clearly explained and each rejected claim specified.

The Examiner does not believe this application raises to the level of complex especially knowing Appellants and Assignees relative level of experience in the field.

Anticipation is a question of fact. *In re King, 801 F.2d 324, 231 USPQ 136 (Fed. Cir. 1986)*. The inquiry as to whether a reference anticipates a claim must focus on what subject matter is encompassed by the claim and what subject matter is described by the reference. As set forth by the court in *Kalman v. Kimberly-Clark Corp. , 713 F.2d 760, 218 USPQ 781, 789 (Fed. Cir. 1983), cert. denied, 465 U.S. 1026 (1984)*, it is only necessary for the claims to " 'read on' something disclosed in the reference, i.e., all limitations in the claim are found in the reference, or 'fully met' by it."Where, as here, a reference describes a class of compositions, the reference must be analyzed to determine whether it describes a composition(s) with sufficient specificity to constitute an anticipation under the statute. See *In re Schaumann 572 F.2d 312, 197 USPQ 5 (CCPA 1978). (reciting from: Ex parte Lee, BPAI at 31 USPQ2d 1105)*

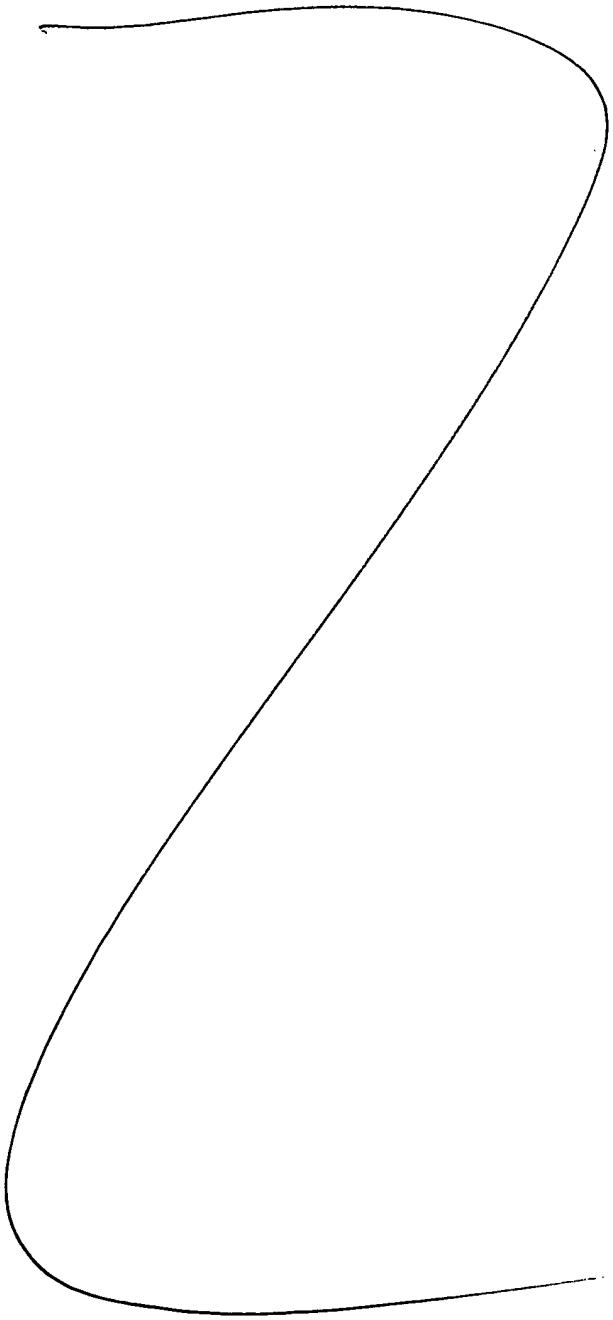
The *prima facie case* is a procedural tool which, as used in patent examination (as by courts in general), means not only that the evidence of the prior art would reasonably allow the conclusion the examiner seeks, but also that ***the prior art compels such a conclusion if the applicant produces no evidence or argument to rebut it***. See Black's Law Dictionary 1071 (5th Ed. 1979). See generally *In re Piasecki, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984)* (citing cases showing the evolution of the concept in patent examination of prima facie obviousness as a legal inference drawn from uncontradicted evidence) (reciting from *In re Spada (CAFC) 15 USPQ2d 1655 (8/10/1990)*). Especially in view of the fact that the courts have held that

A reference anticipates a claim if it discloses the claimed invention such that a skilled artisan could take its teachings in combination with his own knowledge of the particular art and be in possession of the invention. *In re Graves, 36 USPQ2d 1697 (Fed. Cir. 1995); In re Sase, 207 USPQ 107 (CCPA 1980); In re Samour, 197 USPQ 1 (CCPA 1978).*

Prima facie means at first sight, on the first appearance, on the face of it, so far as can be judged from the first disclosure, presumably or a fact presumed to be true unless disproved by some evidence to the contrary. ***Prima facie case is made when such will prevail until contradicted and overcome by other evidence or which has proceeded upon sufficient proof to that stage where it will support finding if evidence to the contrary is disregarded***. (*recited from: Black's Law Dictionary, 5th Edition*) "A prima facie case can be made by the Examiners' assertion of the prior art associated with the pending claims that would render the claims unpatentable. As to the allowability or patentability of Applicants' claimed invention, only a preponderance of the evidence' needs to be applied to make the determination of the allowability or patentability of pending claims." The Examiner notes that Appellants *have not shifted the burden to the Examiner in response to the prima facie showing.*

It is further noted that Appellents have admitted that they have not described how each and every limitation of all the claims are completely supported in the claims (Summary of the Invention). The Examiner respectfully submits that it is even more burdersome for the Examiner to make such an attempt. The Examiner further respectfully submits that any complaints about the Examiner's interpretation of the

claims are without merit in so far as Appellants has never adequately addressed the Examiner's interpretation.



***(11b) Response to Argument – 112(1) Rejections* (pp. 5-7, Appeal Brief)**

In this section, Appellants recite a litany of complaints about the Examiner.

The pertinent issue relates to "combined" or "formed" particles. Appellants have since 1999, variously argued for unsupported meanings or have argued that it is of no consequence.

A brief history of the issue and the case is in order. Appellants are reminded that the Examiner attempted to allow the application at one point in the prosecution:

On page 3, paper # 9, the Examiner argued:

"Applicant's comments regarding reasons for allowance have been carefully reviewed. The comments are not persuasive. A brief history of the issue and the case is in order. The issue pertains to comments on page 9 of paper # 8 regarding Applicant's definition of "combined particle(s)", which were provided in response to Examiner's remarks paragraph 16 of paper # 6. There, the Examiner was trying to determine the meaning of the phrase, "combined particle";

> *"The following clarifications are requested in order to facilitate the examiner's understanding of the applicant's invention. As per claims 1-3, 5, 10, 12, 16-17, 20-24, and 32, it is not clear what the term "combined particle" means with respect to the following. First, with respect to a combined particle formed of only adsorbate particles, does this mean that the individual particles in the combined particle are interacting with each other (through, for example, van der Waals forces and thus the combination represents an underlying physical process) or is this just a fictitious representation which aids in reducing the complexity of the problem? Second, with respect to a combined particle formed of adsorbate particles and substrate particles, what is meant by this combination. Is it a combination in the sense of, for example, a polaron (again a physical criterion) or again a fictitious representation?"*

In paragraph 4 on page 9 of paper # 8, Applicant responded,

> *"First, a combined particle is formed of both substrate particles and adsorbate particles, not simply adsorbate particles as advocated by the Examiner. The combination of a substrate particle and an adsorbate particle to form a combined particle **does not mean that the particles are interacting with one another. Rather, this is meant as a fictitious representation and is not intended as a physical criterion.**"*

The claims were determined to be allowable over the prior art, based on the above assertion. As noted by Examiner, on pg. 3 of paper # 9,

> *"Baumann et al. disclosed the simulation of clusters wherein the clusters were composed of interacting particles (via dipole-dipole or other interparticle forces). Since the particles in applicant's disclosure are not interacting, the art rejection based on Baumann et al. is not applicable. Similarly, there are inter-particle interactions in the disclosure of Misaka et al., and thus, this also is not an applicable citation. The concept of fictitious particles has been disclosed previously (as noted by examiner in the last action - quasi-particles, effective mass electrons in periodic potentials, polarons, etc.), but the concept has apparently not been applied to combinations of substrate and adsorbate particles as per sputtering simulations. Since said "combined particle(s)" is present in each of the independent claims, all claims are allowable over the prior art."*

Appellants, pp. 13-14 of paper # 12 stated that the statement, cited from paper # 8, was misinterpreted. The Examiner, respectfully, disagrees.

The admittance by Appellants, which is of record, has plain and unambiguous meaning.

Appellants subsequently abandoned the case and filed for a CPA. The prior art rejection was therefore reinstated.

In any case, the meaning of "combined" is still not clear and is not elucidated by the specification. As per claims directed at "formed *particles*", the Examiner has

reviewed pp. 31-33 of the specification. The specification only describes the possible composition of the combined particles; but, does not describe *how* the components of the combined particle are combined or formed. The meaning is not clear especially in light of Applicant's various comments in paper # 9 as well as those provided in papers # 16, # 19, # 26 (pp. 4-5), # 29 and # 34. The matter is still not resolved.

It was noted (page 35) that Appellants directed the Examiner's attention to a web site (third paragraph, page 4, paper # 34). The Examiner stated that he would consider an Information Disclosure Statement. The effective content and date of a website is subject to change. Furthermore, the Examiner noted that the date of the earliest software (on the site) was apparently 2001, while Appellants' effective filing date is 12/1996. **Copies of printouts from the website are included for the Board's review. The copyright date is listed as *2001*. Appellants are reminded that they are claiming a priority date of *1996*. Appellants are further reminded that the rejection states that the claims are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.**

Applicants are reminded that the claims were rejected under 35 U.S.C. 112, first paragraph, because *they contain subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.* In response, Applicants simply asserts that it does not matter how the particles are combined. How

could *one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention*, namely combined particles, if the *subject matter was not adequately described in the specification?*

Applicants now state that the concept "*combined*" is of no consequence. However, the particles would have to be "combined" in some fashion during the simulation. The Examiner respectfully submits that it would constitute ***undo experimentation*** to determine how to "combine" the particles. Furthermore, in so far as Applicants have stated (first paragraph, page 5, paper # 26) that limitations directed at "combining" are not to be given patentable weight, the Examiner interpreted that reference to "absorbate" and "substrate" refer to intended use. There are no functional limitations which refer to "absorbate" and "substrate" other than *denotation* of the individual particles. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. See *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963). As stated in paper # 27:

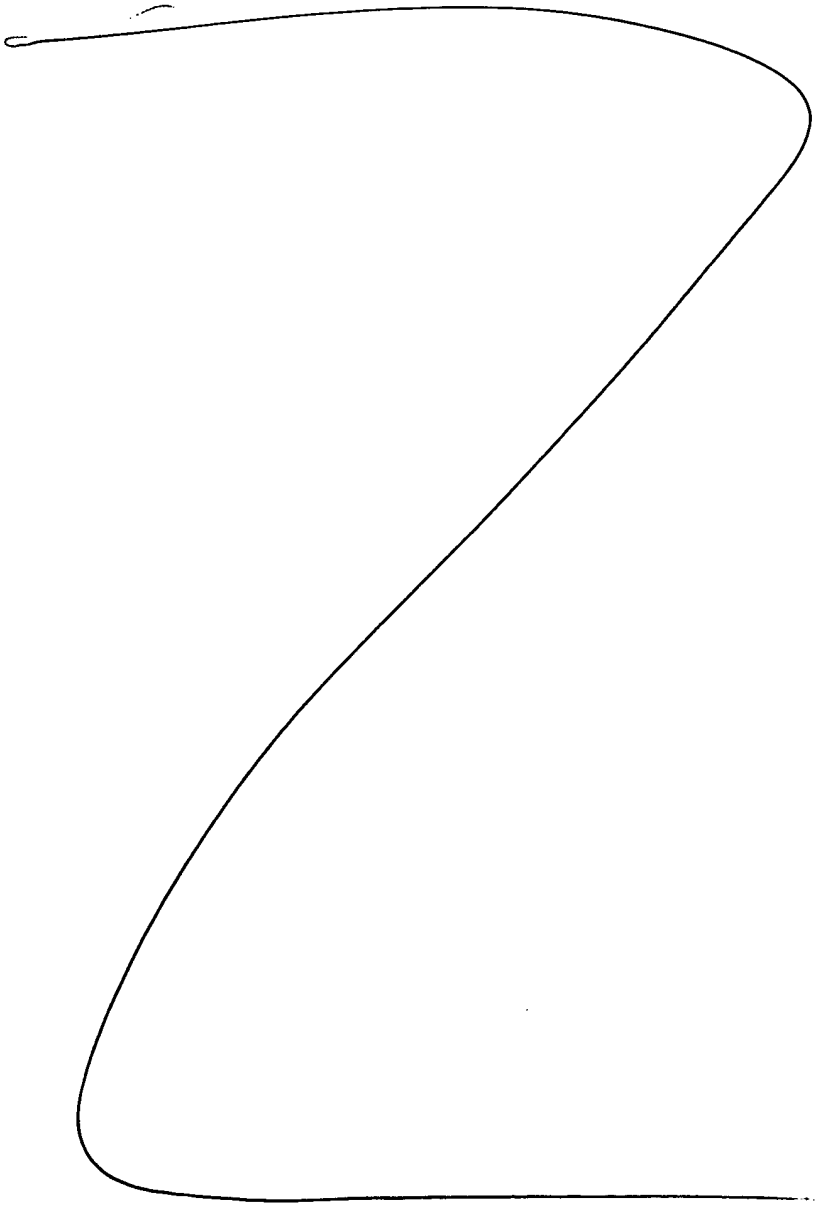
"Therefore, any prior art which recites simulation of a trajectory of a "combined particle" is interpreted as reading on the claims. *The Examiner will remove the 112(1) rejections in the event that Applicants agree with the above interpretations."*

Appellants have been silent in response.

Appellants raise the issue of source code (Paragraphs 2-3, page 7, Appeal Brief) and allege that Appellants had to submit code "in a last-ditch attempt to satisfy the examiner. Alas, in the April 18, 2003 Final Office Action, the Examiner dismissed the source code..." (see middle of pg. 7, Appeal Brief). The Examiner notes that Appellants have not directed Examiner's attention to any particular section of the code or commented on any of the disclosure. The Examiner, in fact, considered the code and noted that many of the copyright dates were years after Appellant's filing date. The argument (pg. 8, Appeal Brief, for example) that they were the dates associated with the creation of the discs are not persuasive – as the Examiner has repeated informed Appellants. The discs were created in 2003. That is not the issue, as stated in paragraph 56, paper # 38 and paragraph 1, paper # 41. The Examiner reviewed the code. However, the Examiner maintained the 112 written description rejections because many of the dates indicated that the portions of code were written *years* after Appellants' filing date. For example, "TABLEM_CELL" lists creation and modification dates of 5/9/2001 and 10/31/2001, respectively. Appellants' filing date is July 8, 1997. In another example, "ewals3.F90" lists dates of 1/28/2002, 1/28/2002, 12/28/2002 on pages 2, page 4, page 6, respectively. Furthermore, there are also 1997 dates on this document, but Appellants claim foreign priority back to 1996. The Examiner, respectfully, is not sure why Appellants feel the Examiner should reconsider the *Written Description Requirement* in light of code that was apparently created after Appellants' filing date. **Appellants are reminded that the rejection states that the claims are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to**

reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Printouts of some of those portions of the code are included for the Board's review.



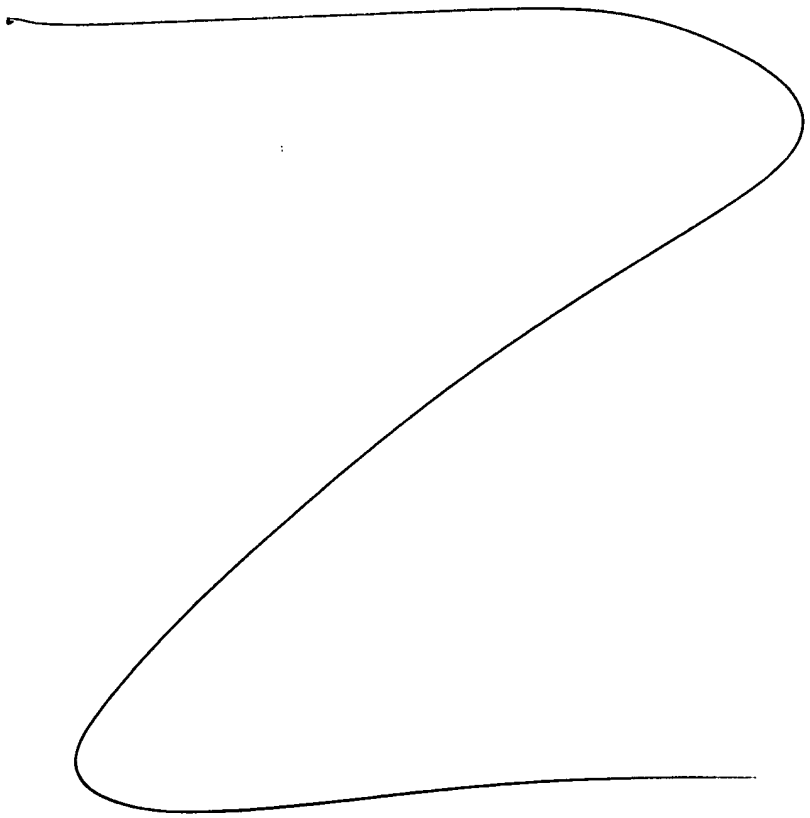
***(11c) Response to Argument – Source Code* (pp. 7-9, Appeal Brief)**

Appellants again raise the issue of source code (pages 7-9, Appeal Brief) and allege that Appellants had to submit code "in an effort to appease the Examiner..." and that the Examiner "summarily rejected the source code submission...". The code was requested in order to determine whether the "formed" or "combined" particles were "formed" or "combined" in a particular manner or were indeed fictitiously considered as one "formed" or "combined" particle. The Examiner notes that Appellants have not directed Examiner's attention to any particular section of the code or commented on any of the disclosure.

The Examiner, in fact, considered the code and noted that many of the copyright dates were years after Appellant's filing date. The argument (pg. 8, Appeal Brief, for example) that they were the dates associated with the creation of the discs are not persuasive – as the Examiner has repeated informed Appellants. The discs were created in 2003. That is not the issue, as stated in paragraph 56, paper # 38 and paragraph 1, paper # 41. The Examiner reviewed the code that could be opened (most files were in some unknown format and could not be opened).

In any case, the Examiner maintained the 112 written description rejections because many of the dates indicated that the portions of code were written *years* after Appellants' filing date. For example, "TABLEM_CELL" lists creation and modification dates of 5/9/2001 and 10/31/2001, respectively. Appellants' filing date is July 8, 1997. In another example, "ewals3.F90" lists dates of 1/28/2002, 1/28/2002, 12/28/2002 on pages 2, page 4, page 6, respectively. Furthermore, there are also 1997 dates on this document, but Appellants claim foreign priority back to 1996. The Examiner, respectfully, is not sure why Appellants feel the

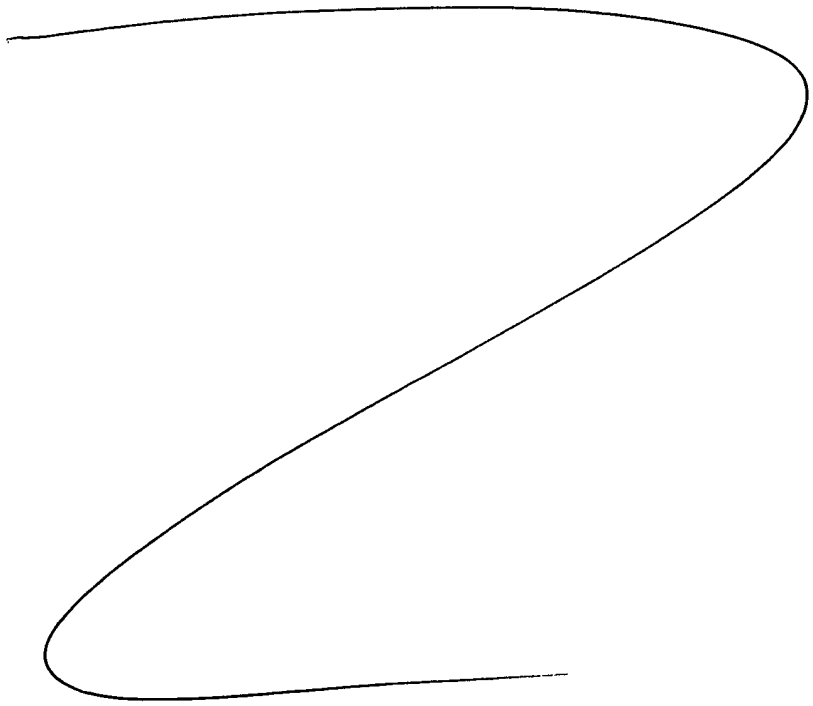
Examiner should reconsider the *Written Description Requirement* in light of code that was apparently created after Appellants' filing date. **Appellants are reminded that the rejection states that the claims are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.** Appellants state (first paragraph, pg. 9, Appeal brief) that they did not intend for the code to be part of the specification. However, it is part of the record since it was used in an attempt to persuade the Examiner of Appellants' arguments. *Printouts of some of those portions of the code are included for the Board's review.*



***(11d) Response to Argument – August 22, 2002 Amendments* (pp. 9-10, Appeal Brief)**

Appellants appear to complain (pg. 10, "If the Examiner would have done as the Applicants are now forced to argue") that the Examiner should search through the specification to ensure that each amendment is supported in the specification. *With all do respect, it is Appellants' responsibility to demonstrate support for amendments.* The Examiner respectfully did consider the four lines as indicated by Appellants (see paragraph 2 of this section on page 9, Appeal Brief), and, respectfully, was not persuaded.

Appellants now do provide a showing of support that, respectfully, should have been presented along with the amendment. The 112(1) rejections relating to Chemical composition" and "physical condition" are withdrawn in response.

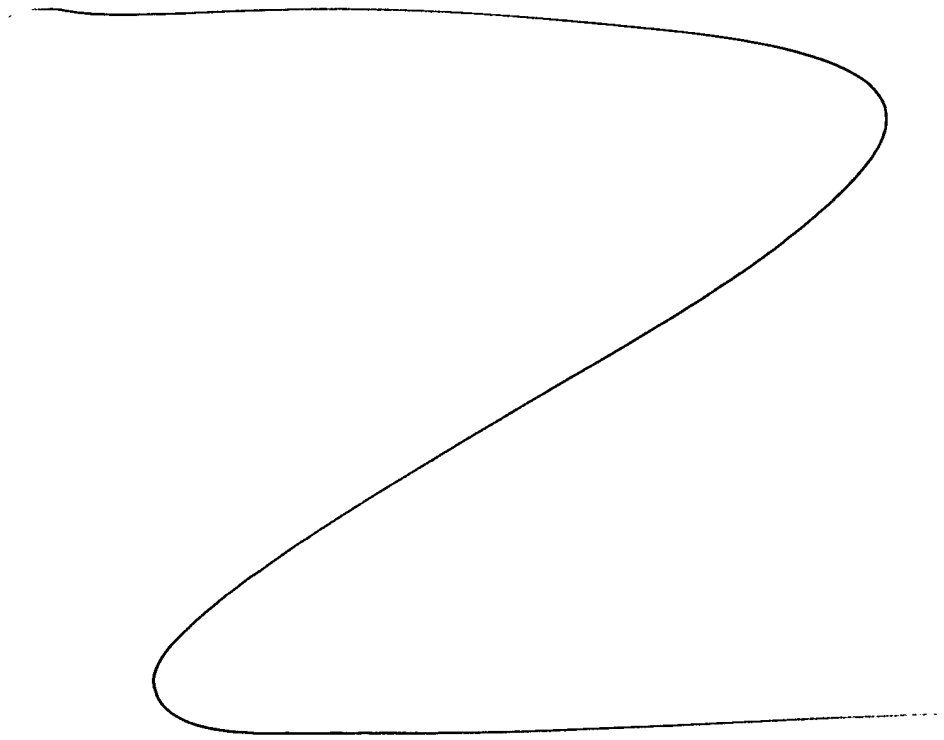


(11e) Response to Argument – 112(2) Rejections **(pg. 11, Appeal Brief)**

Appellants' arguments are not persuasive.

Claims 1, 16, 20, 23, 24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention.

The phrase "a physical condition" is ambiguous. Appellants argue that the phrase is ***enabled*** and thus have not addressed the merits of the rejection. Appellants are reminded that the limitation in question is not in a "means for" structure. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).



***(11f) Response to Argument – 103 Rejections* (pp. 11-12, Appeal Brief)**

Note that reasonable "inferences", and "common sense" may be considered in formulating rejections for obviousness. Specifically, *In re Preda*, 401 F.2d 825, 159 USPQ 342, 344 (CCPA 1968) states "in considering the disclosure of a reference, it is proper to take into account not only specific teachings of the reference but also the inferences which one skilled in the art would reasonably be expected to draw therefrom." Also, *In re Bozek*, 416 F.2d 738, 163 USPQ 545, 549 (CCPA 1969) states that obviousness may be concluded from "common knowledge and common sense of the person of ordinary skill in the art without any specific hint or suggestion in a particular reference". Additionally, see *In re Gauerke*, 24 CCPA 725, 86 F.2d 330, 31 USPQ 330, 333 (CCPA 1936), and *In re Libby*, 45 CCPA 944, 255 F.2d 412, 118 USPQ 94, 96 (CCPA 1958), and *In re Jacoby*, 309 F.2d 738, 125 USPQ 317, 319 (CCPA 1962), and *In re Wiggins*, 488 F.2d 538, 543, 1979 USPQ 421, 424 (CCPA 1973).

A brief history of the application is in order. A few introductory remarks are first presented. **Appellants are reminded that the Examiner attempted to allow the application at one point in the prosecution.** Appellants objected to the reasons for allowance "comments regarding reasons for allowance" (pp. 13-14, paper # 12) The comments were not persuasive. The issue pertained to comments on page 9 of paper # 8 regarding Applicant's definition of "combined particle(s)", which were provided in response to Examiner's remarks paragraph 16 of paper # 6. There, the Examiner was trying to determine the meaning of the phrase, "combined particle";

"The following clarifications are requested in order to facilitate the examiner's understanding of the applicant's invention. As per claims 1-3, 5, 10, 12, 16-17, 20-24, and 32, it is not clear what the term "combined particle" means with respect to the following. First, with respect to a combined particle formed of only adsorbate particles, does this mean that the individual particles in the combined particle are interacting with each other (through, for example, van der Waals forces and thus the combination represents an underlying physical process) or is this just a fictitious representation which aids in reducing the complexity of the problem? Second, with respect to a combined particle formed of adsorbate particles and substrate particles, what is meant by this combination. Is it a combination in the sense of, for example, a polaron (again a physical criterion) or again a fictitious representation?"

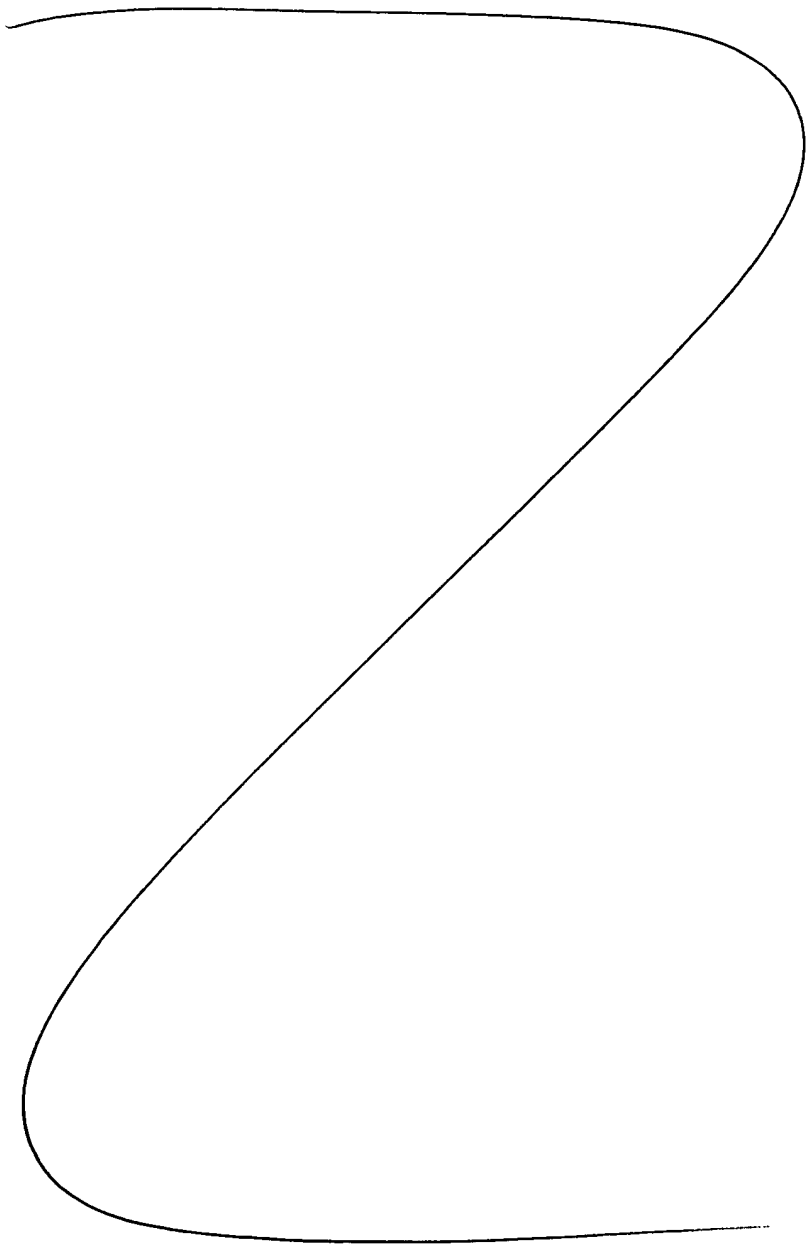
In paragraph 4 on page 9 of paper # 8, Applicant responded,

"First, a combined particle is formed of both substrate particles and adsorbate particles, not simply adsorbate particles as advocated by the Examiner. The combination of a substrate particle and an adsorbate particle to form a combined particle ***does not mean that the particles are interacting with one another. Rather,*** *this is meant as* ***a fictitious representation and is not intended as a physical criterion.***"

The claims were determined to be allowable over the prior art, based on the above assertion. As noted by Examiner, on pg. 3 of paper # 9,

"Baumann et al. disclosed the simulation of clusters wherein the clusters were composed of interacting particles (via dipole-dipole or other interparticle forces). Since the particles in applicant's disclosure are not interacting, the art rejection based on Baumann et al. is not applicable. Similarly, there are inter-particle interactions in the disclosure of Misaka et al., and thus, this also is not an applicable citation. The concept of fictitious particles has been disclosed previously (as noted by examiner in the last action - quasi-particles, effective mass electrons in periodic potentials, polarons, etc.), but the concept has apparently not been applied to combinations of substrate and adsorbate particles as per sputtering simulations. Since said "combined particle(s)" is present in each of the independent claims, all claims are allowable over the prior art."

Applicant, pp. 13-14 of paper # 12 asserted that the statement, cited from paper # 8, was misinterpreted. Applicant subsequently abandoned the case and filed for a CPA. The prior art rejection was therefore reinstated.



(11g) Response to Argument – 103 Rejections and Inherency **(pp. 12-14, Appeal Brief)**

The Examiner would first like to point out that reasonable "inferences", and "common sense" may be considered in formulating rejections for obviousness. Specifically, *In re Preda*, 401 F.2d 825, 159 USPQ 342, 344 (CCPA 1968) states "in considering the disclosure of a reference, it is proper to take into account not only specific teachings of the reference but also the inferences which one skilled in the art would reasonably be expected to draw therefrom." Also, *In re Bozek*, 416 F.2d 738, 163 USPQ 545, 549 (CCPA 1969) states that obviousness may be concluded from "common knowledge and common sense of the person of ordinary skill in the art without any specific hint or suggestion in a particular reference". Additionally, see *In re Gauerke*, 24 CCPA 725, 86 F.2d 330, 31 USPQ 330, 333 (CCPA 1936), and *In re Libby*, 45 CCPA 944, 255 F.2d 412, 118 USPQ 94, 96 (CCPA 1958), and *In re Jacoby*, 309 F.2d 738, 125 USPQ 317, 319 (CCPA 1962), and *In re Wiggins*, 488 F.2d 538, 543, 1979 USPQ 421, 424 (CCPA 1973).

Applicants appear to argue that it is not inherent to have a particle source for a particle simulation. The Examiner, respectfully, is at odds to think of how such a simulation could be carried out without specifying a source. The particles must be accounted for at all times in their trajectories, including initial conditions. It is noted that the Examiner has relied on inherency since at least paper # 6 (*five years ago* - 1998). ***Applicants had earlier acquiesed to such a determination by their silence.*** The Examiner respectfully submits that such arguments are late in the prosecution and

respectfully are simply not persuasive. Again, Appellants have not explained or even offered any reasoning how such a simulation as disclosed in the art could be carried out without specifying a source. Appellants allege that the Examiner has provided no evidence, but instead relied on his own experience. The Examiner has repeatedly, in response to Appellants' concern about inherency, referred to the prior art, as well as to the additional paper authored by the Examiner, and supplied in response to Appellants' request. Appellants have been silent in response.

Misaka et al. disclose (fig. 1) a Monte Carlo simulation of particle transport. It is inherent that a simulated particle with a trajectory must start from some initial position. **That is a "source"**. It simply must be present. Consider figure 2 which discloses incoming active radicals (fig. 2a) impinging on a substrate. The active radicals originate from a source (a starting point). Similarly, consider fig. 2b-2e. A Monte Carlo simulation of a particle trajectory without a source simply will not work.

Yamada et al. discloses details of a Monte Carlo simulation of sputtering. See entire disclosure. Especially note fig. 1-3. The particles have trajectories. Fig. 2 discloses the initial position of the particle "r" which in a simulation specifies the source.

Baumann et al. disclose 3D modeling of sputtering using a mesoscopic hard-sphere Monte Carlo model. (see fig. 1 of Baumann et al.). Baumann et al. simulate the behavior of *clusters* as they interact with a substrate (note that the

use of ion cluster beams and molecular beams for deposition and/or sputtering are well known techniques; this phenomena has also been simulated.). See pg. 4.4.1 and fig. 1-2. See col. 1 of pg. 4.4.2 wherein molecular dynamics calculations are carried out including trajectories and interatomic potentials. ***It is impossible to do such calculations without first specifying initial conditions (starting point or source).***

Husinsky et al. disclose "*Fundamental aspects of SNMS for thin film characterization: Experimental studies and computer simulations.*" See section 4 (sputtering) including section 4.1 (sputtered flux - fig. 4, 9 and 16 - showing combined particles); section 4.3 (computer simulation of sputtering) and section 4.4 (cluster emission). Consider fig. 4, wherein incident ions impinge on the substrate. ***Those ions, inherently came from some starting position or source.***

Most notably, Appellants have especially ignored, throughout prosecution, the teachings in the Kinema/Sim manual, and which Appellants now allege that they are "not sure if they have the correct copy".

Consider Kinema/Sim:

Kinema/SIM is a software tool that presents a simulation space for particle behavior where one can construct and animate complex physical phenomena. See entire disclosure.

- Examples of the graphical interface are shown on pp. 1-8 to 1-9;

- the "particle window" is shown on pg. 2-7; here the particle parameters can be altered;

- "coordinate systems" are discussed on pg. 3-3;

- probability functions for particle speed, lifetime, ***emission angles (pg. 3-11)***;

- details about simulation parameter values including ***source rate***, display, particle interactions and emission sources (chapter 6);

- source rate (pg. 6-4);

- a combined particle (pg. 6-5), wherein

> *"The Euler mode, on the other hand, calculates forces more globally and therefore has the advantage of maintaining simulation speed. It calculates only one force per cell at time t, which is applied to* ***all particles in the cell.*** *... ";*

- Chapter 7 discloses "Particles";

- particle coupling (pg. 7-1);

- particle examples (pg. 7-1), wherein

> *"Particles are the key element in Kinema/SIM simulations. They are point objects that can represent a broad range of physical and image characteristics such as mass, charge, color, motion and geometry. In your simulation, particles can represent a diversity of real or image objects such as quantum physics particles, gas molecules, aerosol droplets, bacteria, fluid flow, dust, rain, snow, sand, or pixels of images. The possibilities are as numerous as the phenomena of reality and creative animtion ...*
>
> ... **Particles are emitted into the simulation via sources** *which can be visible or invisible points or geometric objects positioned in simulation space. ...";*

- Chapter 8 (source parameters);

- sources (pg. 8-1), wherein

"Sources are orgins that emit particles into the simulation, and all particles must enter the simulation via a source. Sources can be points or have spatial geometry which you can choose to see or hide in simulation space. You can define as many sources as you like for a system, but each source is restricted to emit only one particle type. (If you want to have more than one particle type originate from the same position, you can superimpose sources at the point. ...

... In the source window you assign a particle type to the source and then define the rate and speed of the particles along with their spread angle into the simulation. ... "

The "spread angle" is Applicant's "cone".;

- source window (pg. 8-3);

- source rate (pg. 8-4);

- Spread (pg. 8-5);

- speed (pg. 8-6);

- source position (pg. 8-10);

- display (pg. 8-11);

- geometry (pg. 8-13);

- particle emission and geometry (pp. 8-15 to 8-16);

- particle generation (pp. 8-16 to 8-17);

Reeves discloses animation of particle behavior and discloses the concept of combined particle. On page 91,

"First, an object is represented not by a set of primitive surface elements, such as polygons or patches, that define its boundary, but as clouds of primitive particles that define its volume."

Section 2.1 discloses particle generation. Section 2.2 discloses:

"For each new particle generated, the particle system must determine values for the following attributes:

(1) initial position,

(2) initial velocity (both speed and direction),

(3) initial size,

(4) initial color,

(5) initial transparency,

(6) shape,

(7) lifetime.

Section 2.3 discloses particle dynamics. ***Reeves*** discloses (pg. 92, last paragraph) that particles are generated.

Cohen discloses "*Computer animations, quantum mechanics and elementary particles.*" See entire disclosure. The following is from pg. 165;

"In a typical animation, starting from a small number of virtual particles, the number tends to increase as a function of time, signaling the deviation from the physical states. A physical particle contains a cloud of finite size of virtual particles. The animation actually allows us to see the formation of such clouds. It is rather amusing to identify dressed objects mainfesting collective behavior, and then analyze the space renormalization group of the clouds by zooming in."

On page 166, the following is found:

The visualization "dictionary" developed for computer animations of quantum systems ***can be applied to any process following the rules of one or several of Nature's fundamental interactions. Animation of various atomic and subatomic phenomena*** *such as electron orbitals, particle collisions, radiactive decay, fusion, fission, etc. are therefore feasible and instructive."*

Ohira et al. discloses details of a Molecular-dynamics simulation of sputtering. See: abstract; pg. 2 (Theoretical Methods) and especially fig. 1. Fig. 1 discloses "incident radicals" (as well as ***temperature control particles***). The "incident radicals" from incident from somewhere, namely, a source.

In fact, the Examiner has provided other evidence, namely a journal paper written by the Examiner and published in Physical Review. However, Appellants have not even acknowledged the reference. Considering Appellants' concerns about the Examiner's personal knowledge, it is noted that Applicant has not provided any remarks concerning the Examiner's publication, pertaining to particle simulation, in ***Physical Review*** (Jones et al. "Monte Carlo Investigation of Electron-Impact Ionization in Liquid Xenon." Physical review B; pp. 9382-9387; 1993.), which was provided for Applicants. The Examiner's recollections were based on extensive experience in the field of particle simulation which was challenged. In response evidence was provided to Appellants. Appellants has maintained their silence in response to evidence regarding sources in simulations.

Respectfully, the Examiner has exerted a great deal of effort to provide Appellants with evidence, pertinent art and well reasoned arguments and to respond to their arguments. Appellants have not explained why the evidence (the applied art as well the the Examiner's own paper) should not be considered as persuasive and a proper response to the request for evidence.

(11h) Response to Argument – 103 Rejections and Motivation **(pp. 15-17, Appeal Brief)**

Appellants argue that a motivation has not been provided

The Examiner would first like to point out that reasonable "inferences", and "common sense" may be considered in formulating rejections for obviousness. Specifically, *In re Preda*, 401 F.2d 825, 159 USPQ 342, 344 (CCPA 1968) states "in considering the disclosure of a reference, it is proper to take into account not only specific teachings of the reference but also the inferences which one skilled in the art would reasonably be expected to draw therefrom." Also, *In re Bozek*, 416 F.2d 738, 163 USPQ 545, 549 (CCPA 1969) states that obviousness may be concluded from "common knowledge and common sense of the person of ordinary skill in the art without any specific hint or suggestion in a particular reference". Additionally, see *In re Gauerke*, 24 CCPA 725, 86 F.2d 330, 31 USPQ 330, 333 (CCPA 1936), and *In re Libby*, 45 CCPA 944, 255 F.2d 412, 118 USPQ 94, 96 (CCPA 1958), and *In re Jacoby*, 309 F.2d 738, 125 USPQ 317, 319 (CCPA 1962), and *In re Wiggins*, 488 F.2d 538, 543, 1979 USPQ 421, 424 (CCPA 1973).

Consider the rejection of claim 20, for example.

> Ohira et al. discloses details of a Molecular-dynamics simulation of sputtering. See: abstract; pg. 2 (Theoretical Methods) and especially fig. 1.
>
> [Ohira et al.] discloses all claim limitations (**see fig. 1 - temperature control particles**) except for a

teaching of animation of the simulation. (Kinema/SIM *or* Reeves *or* Cohen) teach that it was obvious and well known to one of ordinary skill in the art at the time of the invention to animate simulations of physical processes. (Kinema/SIM *or* Reeves *or* Cohen) provide details about animations of particles. The teachings of (Kinema/SIM *or* Reeves *or* Cohen) were presented earlier.

Note that the first limitation in claim 20 merely recites that the "setting information ... ***can*** *include* a position of a corresponding emission source, a temperature, a chemical composition of the particle, a region, a physical condition, a velocity of each atom forming the particle, and a direction;". In other words, none of the "a position of a corresponding emission source, a temperature, a chemical composition of the particle, a region, a physical condition, a velocity of each atom forming the particle, and a direction" are required for the claim.

A full recitation of all claim rejections will be found in the appendix.

Appellants had previously improperly attempted to challenge (page 5, paper # 34) the taking of Official Notice relating to Monte Carlo simulations and displays. It is noted that Appellants had not provided any remarks concerning the Examiner's publication, pertaining to

particle simulation using Monte Carlo techniques, in ***Physical Review***, which was provided to Appellants' in response.

Considering the Applicant's concerns about the Examiner's personal knowledge, it is puzzling as to why Appellants have not provided any remarks concerning the Examiner's publication, pertaining to particle simulation, in ***Physical Review*** (Jones et al. "Monte Carlo Investigation of Electron-Impact Ionization in Liquid Xenon." Physical review B; pp. 9382-9387; 1993.), which was provided for Appellants' benefit. The Examiner's recollections were based on extensive experience in the field of particle simulation. This was challenged. In any case, the art was provided to Appellants. Considering the Appellants' remarks quoted above, and in view of the art provided by the Examiner in response to Applicant's demand (paragraph 67, paper # 15; paragraphs 7-8 of paper # 9), *there has been no substantial arguments or remarks directed at said demanded prior art.* Appellants' silence (paper # 16) was regarded as acquiescence and therefore admitted prior art. In any case, the earliest challenge was neither seasonable (paper # 34) nor proper because Applicants have not even attempted to create on its face a reasonable doubt regarding the circumstances justifying the notice. See MPEP 2144.03 [R-1]. ***Appellants are still silent.***

In response to applicant's arguments against the references individually (pp. 5-10, paper # 34), one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). The Examiner continued to repeat the above in response to Applicant's continued "piecemeal" analysis of the 103 rejections.

Applicants have stated that the concept "*combined*" is of no consequence. In so far as Applicants have stated (first paragraph, page 5, paper # 26) that limitations directed at "combining" (which means the same as "***formed***", in the context of Applicant's invention) are not to be given patentable weight, the Examiner interprets that reference to "absorbate" and "substrate" refer to intended use. There are no functional limitations which refer to "absorbate" and "substrate" other than *denotation* of the individual particles. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. See *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963). Therefore, any prior art which recites simulation of a trajectory of a "combined particle" is interpreted as reading on the claims.

Appellants have been silent in response.

Again, Examiner has exerted a great deal of effort to provide Applicant with pertinent art and well reasoned arguments, and respectfully *requests that Applicant point to specific instances in the prior art of record* where a specific teaching is lacking or where there is a teaching away from Applicant's claims.

Appellants' earlier characterization of the teachings of Baumann and Misaka again trivialized and misstated their inventions. For example, the characterization of the Baumann teaching as "...*incoming spheres* ..." again ignores the teaching of a simulation of Sputtering -

that which Applicant is attempting to claim. ***Page 4.4.2 of Baumann discloses molecular dynamic simulation (simulation of trajectories).*** As per Misaka, see fig. 2; col. 9, line 65 to col. 10, line 9, wherein trajectories are discussed. ***In either Baumann or Misaka, it is inherent that a source must exist for each particle.***

Appellants' earlier characterization of the teaching of Reeves trivialized and mischaracterized the invention - Please refer to the detailed rejections as well as the teachings. *For example, and Examiner would again like to point out -* ***reference to "fuzzy" is irrelevant and has absolutely nothing to do with the issues at hand.*** As recited in numerous Official Office Actions: "Reeves discloses ***animation of particle behavior*** and discloses the concept of combined particle. On page 91,

> *"First, an object is represented not by a set of primitive surface elements, such as polygons or patches, that define its boundary, but as clouds of* ***primitive particles*** *that define its volume."*

Section 2.1 discloses particle generation. Section 2.2 discloses:

> *"For* ***each new particle generated****, the particle system must determine values for the following attributes:*
>
> *(1)* ***initial position,***
>
> *(2)* ***initial velocity (both speed and direction),***
>
> *(3) initial size,*
>
> *(4) initial color,*
>
> *(5) initial transparency,*
>
> *(6) shape,*

(7) lifetime.

Section 2.3 discloses particle dynamics."

Please note the bold-faced portions - ***which define particle sources***.

70. As recited in the Official Office Actions, "Cohen discloses "*Computer animations, quantum mechanics and elementary particles.*" See entire disclosure. The following is from pg. 165;

> *"In a typical animation, starting from a small number of virtual particles, the number tends to increase as a function of time, signaling the deviation from the physical states. A physical particle contains a cloud of finite size of virtual particles. The animation actually allows us to see the formation of such clouds. It is rather amusing to identify dressed objects mainfesting collective behavior, and then analyze the space renormalization group of the clouds by zooming in."*

On page 166, the following is found:

> *The visualization "dictionary" developed for computer animations of quantum systems* ***can be applied to any process following the rules of one or several of Nature's fundamental interactions. Animation of various atomic and subatomic phenomena*** *such as electron orbitals, particle collisions, radiactive decay, fusion, fission, etc. are therefore feasible and instructive.""*

Cohen discloses particle sources.

As recited in the Official Office Actions: "Kinema/SIM is a software tool that presents a simulation space for particle behavior where you can construct and animate complex physical phenomena. See entire disclosure. A number of features are subsequently listed for Applicant's benefit.

- Examples of the ***graphical interface*** are shown on pp. 1-8 to 1-9;

- the "***particle window***" is shown on pg. 2-7; here the **particle parameters can be altered**;

- "Lifetime" defines the particle lifetime (pg. 2-9);

- "***particle geometry***" is discussed on pg. 2-11;

- "***coordinate systems***" are discussed on pg. 3-3;

- entering particle parameter values via slider buttons (pg. 3-10;

- probability functions for ***particle speed, lifetime, emission angles*** (pg. 3-11);

- other relevant temporal parameters (pg. 3-16);

- ***GUI simulation controls*** (pg. 5-2);

- statistical features (ie., *group behavior* - pg. 5-3);

- ***particles, obstacles*** (pg. 5-5);

- deatils about simulation parameter values including ***source rate, display, particle interactions and emission sources*** (chapter 6);

- ***range of interactions between particles*** (pg. 6-3);

- ***source rate*** (pg. 6-4);

- ***a combined particle*** (pg. 6-5), wherein

> *"The Euler mode, on the other hand, calculates forces more globally and therefore has the advantage of maintaining simulation speed. It calculates only one force per cell at time t, which is applied to **all particles in the cell.** ... ";*

- Chapter 7 discloses "***Particles***";

- ***particle coupling*** (pg. 7-1);

- particle examples (pg. 7-1), wherein

"Particles are the key element in Kinema/SIM simulations. They are point objects that can represent a broad range of physical and image characteristics such as mass, charge, color, motion and geometry. In your simulation, particles can represent a diversity of real or image objects such as quantum physics particles, gas molecules, aerosol droplets, bacteria, fluid flow, dust, rain, snow, sand, or pixels of images. The possibilities are as numerous as the phenomena of reality and creative animtion ...

... Particles are emitted into the simulation via sources which can be visible or invisible points or geometric objects positioned in simulation space. ...";

- particles parameter window (pg. 7-3 to 7-4);

- *"Sigma", a parameter related to particle-particle interactions* (pp. 7-13 to 7-14);

- decay particles (pg. 7-21);

- particle coupling (pp. 7-22 to 7-23);

- Chapter 8 (source parameters);

- ***sources*** (pg. 8-1), wherein

"Sources are orgins that emit particles into the simulation, and all particles must enter the simulation via a source. Sources can be points or have spatial geometry which you can choose to see or hide in simulation space. You can define as many sources as you like for a system, but each source is restricted to emit only one particle type. (If you want to have more than one particle type originate from the same position, you can superimpose sources at the point. ...

... In the source window you assign a particle type to the source and then define the rate and speed of the particles along with their spread angle into the simulation. *... "*

The "spread angle" is Applicant's "cone";

- source window (pg. 8-3);

- source rate (pg. 8-4);

- **Spread** (pg. 8-5);

- speed (pg. 8-6);

- ***source position*** (pg. 8-10);

- display (pg. 8-11);

- geometry (pg. 8-13);

- ***particle emission and geometry*** (pp. 8-15 to 8-16);

- ***particle generation*** (pp. 8-16 to 8-17);

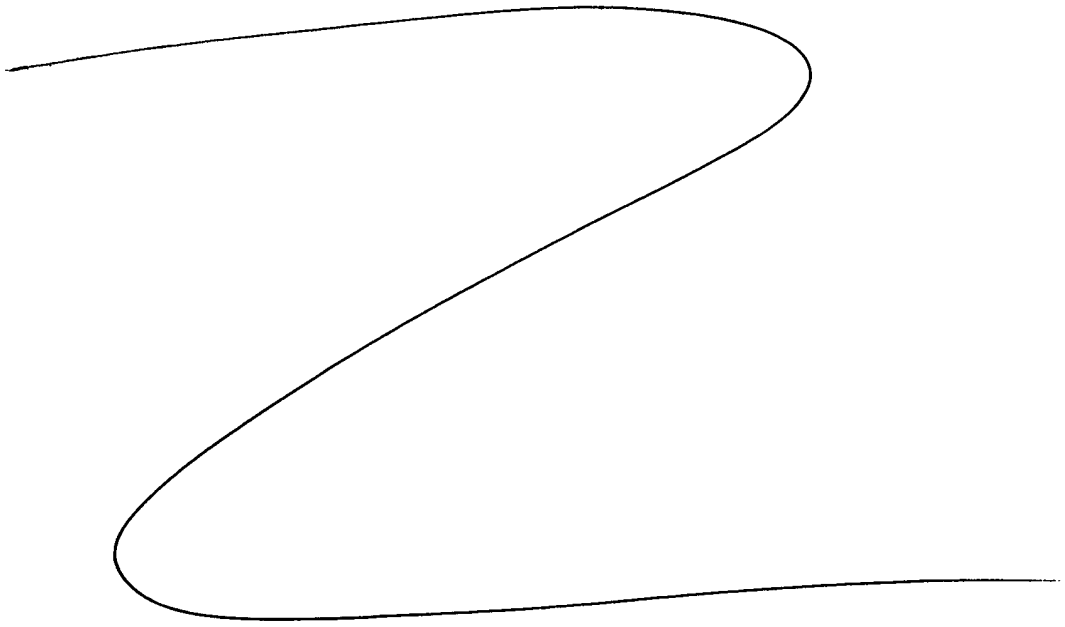
- Chapter 9 "Obstacles";

- Chapter 13, "electric fields";

- Chapter 15, "***particle events***";

- elastic and inelastic particle collisions (pp. 15-1 to 15-2)".

Kinema/Sim discloses particle sources.



Appendix

(11i) Response to Argument – Appendix –Recitation of the Claim Rejections

Claims 1, 3-9, 11-20 and 22-31 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

As per claims directed at "formed particles" (claims 1, 3-9 and 11-31), Examiner has reviewed pp. 31-33 of the specification. The specification only describes the composition of the combined particles; but, does not describe how the components of the formed (*combined*) particle are *formed*, as would be required to make and/or use the invention. A reader would have to reinvent the invention. The meaning is not clear. The claims recite "formed particles". The particles therefore would have to be *combined* somehow during the course of the simulation. How is this done? It would constitute undue experimentation for a reader of any issued patent to make and/or use the claimed invention.

Claims 1, 3-9, 11-20 and 22-31 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

As per claims directed at "formed particles" (claims 1, 3-9 and 11-31), Examiner has reviewed pp. 31-33 of the specification. The specification only describes the composition of the combined particles; but, does not describe how the components of the formed (*combined*) particle are *formed*, as would be required to make and/or use the invention. A reader would have to reinvent the invention. The meaning is not clear. The claims recite "formed particles". The particles therefore would have to be *combined* somehow during the course of the simulation. How is this done?

Claims 1, 16, 20, 23, 24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. This pertains to "*a physical condition*". The phrase is ambiguous.

Claim Interpretations used in the examination of the claims

In general, the applicants are disclosing method and apparatus to simulate the trajectory of a "combined" or "formed" particle. The Applicant states that the concept "*combined*" is of no consequence.

In so far as Applicants have stated (first paragraph, page 5, paper # 26) that limitations directed at "combining" are not to be given patentable weight, the Examiner interprets that reference to "absorbate" and "substrate" refer to intended use. There are no functional limitations which refer to "absorbate" and "substrate" other than *denotation* of the individual particles. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order

to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. See *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963). Therefore, any prior art which recites simulation of a trajectory of a "combined particle" is interpreted as reading on the claims.

The prior art rejections were based on this interpretation of the specification and claims.

Claims 1, 3-9, 11-20, 22-31 are rejected under 35 U.S. C. 103 (a) as being unpatentable over (Misaka et al. *or* Baumann et al.) in view of the Examiner's own experience and the taking of Official Notice.

Misaka et al. disclose a dry-etching process simulator wherein a surface reaction model is used to simulate topological evolutions by taking into account the existence of adsorbed radicals on the substrate surface. Baumann et al. disclose 3D modeling of sputtering using a mesoscopic hard-sphere Monte Carlo model. (see fig. 1 of Baumann et al.). Baumann et al. simulate the behavior of *clusters* as they interact with a substrate (note that the use of ion cluster beams and molecular beams for deposition and/or sputtering are well known techniques; this phenomena has also been simulated.). Both sets of inventors are concerned with the simulating the dynamics of particles which are interacting with a substrate during processing of the substrate. The claims are reviewed and the contributions by each inventor, as outlined above, are noted.

As per claim 1, this is concerned with an apparatus for simulating phenomena of a particle formed of adsorbate particles and substrate particles, Misaka et al.: figs. 1, 2, 3b, 4, 5 ("calculate fluxes"); col. 1, lines 35-68; col. 2, lines 29-34 and 49-59; col. 3, lines 16-68; col. 4, lines 50-65; Baumann et al.: pg. 4.4.1 and fig. 1), **comprising: a kinetic condition setting unit** (this is inherent in particle simulators such as monte Carlo simulators) **which sets information for defining a plurality of generation periods and a corresponding number of adsorbate particles to be generated during each generation period** (Misaka et al.: figs. 1, 2, 3b, 4, 5 ("calculate fluxes"); col. 1, lines 35-68; col. 2, lines 29-34 and 49-59; col. 3, lines 16-68; col. 4, lines 50-65; Baumann et al.: pg. 4.4.1 and fig. 1) **wherein the information *can* include a position of a corresponding emission source, a temperature, a chemical composition of the particle, a region, a physical condition, a velocity of each atom forming the particle, and a direction** (Misaka et al.: abstract; figs. 1, 2, 5 ("calculate fluxes"); col. 2, lines 29-34 and 49-64; col. 3, lines 3-68; col. 4, lines 1-6; Baumann et al.: temperatue: fig. 6]; inherent on pg. 4.4.1)**; and**

a particle motion computing unit which generates the individual particles in accordance with the information set by the kinetic condition setting unit and computes motion of the generated adsorbate particles, to simulate phenomena of said particle formed of adsorbate and substrate particles, each adsorbate particle having a corresponding emission source (again, this is inherent in particle simulators such as Monte Carlo simulators; Misaka et al.: abstract; fig. 1,2; col. 2 lines 49-59 and 59-64; col. 3, lines 3-68; col. 4, lines 1-6; Baumann et al.: pg, 4.4.1);

for each adsorbate particle, the kinetic condition setting unit sets a region indicating a position of the corresponding emission source (Misaka et al.: fig. 1, # 15; also inherent in figs. 2, 7, 8b, 10; Baumann et al.: inherent in fig. 1), and

the particle motion computing unit generates each adsorbate particle in accordance with the position of the corresponding emission source (Misaka et al.: fig. 1, # 15; Baumann et al.: inherent in fig. 1).

As per claim 3, this is concerned with an apparatus as in claim 1, wherein before generating the adsorbate particles, the particle motion computing unit generates the substrate particles (this would seem to be inherent as well as obvious; why generate particles which are to interact with a target if the target is not there; Misaka et al.: figs. 1, 2, 3b, 4, 5, 7, 8b, 9, 10; col. 1, lines 35-68; col. 3, lines 16-68; col. 4, lines 50-65; Baumann et al.: fig. 1; inherent in fig. 2).

As per claim 4, this is concerned with an apparatus as in claim 1, further comprising:

a display which allows a user to enter the information set by the kinetic condition setting unit (this is standard with respect to particle simulators in general. I have personally done this as it pertains to Monte Carlo simulations).

As per claim 5, this is concerned with an apparatus as in claim 1, wherein the kinetic condition setting unit sets information for generating the substrate particles (obviously, this information must be provided for each species; Misaka et al.: figs. 1, 2, 5 ("calculate fluxes"),- col. 2, lines 29-34 and 49-59, Baumann et al.: pg. 4.4.1).

As per claim 6, this is concerned with an apparatus as in claim 1, wherein each adsorbate particle is formed of atoms (Misaka et al.: fig. 1 ("radical"), fig. 2, fig. 4 (b,c,d); Baumann et al. - fig. 1; pg. 4.4.1) - this is also *inherent*;

the information set by the kinetic condition setting unit includes information indicating whether the atoms of a respective adsorbate particle are static against center of mass of the adsorbate particle (inherent in clusters); **and**

when the particle motion computing unit generates an adsorbate particle and the information set by the kinetic condition setting unit indicates that the atoms of the respective adsorbate particle are not static against the center of mass, the particle motion computing unit provides a random orientation to the atoms of the adsorbate particle (Official notice is taken that this physical phenomena and approximations so as to take it into account in simulations were well known in the art at the time of the invention. [see for example studies of ion attachment to electrodes submersed in salt solutions, studies of nucleation, or the motion of electrons around moving atoms or molecules]).

As per claim 7, this is concerned with an apparatus as in claim 6, further comprising:

a display which allows a user to enter the information set by the kinetic condition setting unit (this is standard with respect to particle simulators in general. I have personally done this as it pertains to Monte Carlo simulations).

As per claim 8, this is concerned with an apparatus as in claim 1, wherein each adsorbate particle is formed of atoms (Misaka et al.: fig. 1 ("radical"), fig. 2, fig. 4 (b,c,d); Baumann et al.: fig. 1; pg. 4.4.1),

the information set by the kinetic condition setting unit includes information indicating whether the smaller particles of a respective adsorbate particle are static against center of mass of the adsorbate particle (inherent in simulation of clusters**), and**

when the particle motion computing unit generates an adsorbate particle and the information set by the kinetic condition setting unit indicates that the atoms of the respective adsorbate particle are not static against the center of mass, the particle motion computing unit provides an initial velocity to the atoms of the absorbate (I assume the applicant is talking about molecules here? [in which case the parts of the molecule interact with each other via vibrational modes, and thus are not bound]) **particle** (Official notice is taken that this physical phenomena and approximations so as to take it into account in simulations were well known in the art at the time of the invention. [see for example studies of ion attachment to electrodes submersed in salt solutions, studies of nucleation, or the motion of electrons around moving atoms or molecules]).

As per claim 9, this is concerned with an apparatus as in claim 1, wherein, when generating an adsorbate particle, the particle motion computing unit provides a random direction within a cone pointed at a substrate and being centered at a point of generation of center of mass velocity of the adsorbate

particle (this is inherent in particle simulations in general, and in Monte Carlo simulations, in particular [see for example studies of gaseous discharges wherein an electron is emitted from a cathode or an electron is ejected from an atom due to collisional ionization]).

As per claim 11, this is concerned with an apparatus as in claim 1, further comprising a display which displays the information set by the kinetic condition setting unit (this is standard with respect to particle simulators in general. I have personally done this as it pertains to Monte Carlo simulations).

As per claim 12, this is concerned with an apparatus for simulating phenomena of a particle formed of adsorbate particles and substrate particles, each adsorbate particle having a corresponding emission source, the apparatus comprising:

an input device which allows a user to designate a region (this is standard with respect to particle simulators in general. I have seen done this as it pertains to Monte Carlo simulation
[specifying the position of the cathode which is to eject electrons]; Misaka et al.: figs, 1, 5, 7, 8b, 9, 10- Baumann et al.: inherent in fig. 1);

a kinetic condition setting unit which, for each adsorbate particle, sets the region designed by the user as a region indicating a position of the corresponding emission source (Misaka et al. fig. 1, # 15; Baumann et al.: inherent in fig. 1); **and**

a particle motion computing unit which generates the adsorbate particles in accordance with the position of the corresponding emission source as indicated by the region designated by the user and computes motion of the generated adsorbate particles, to simulate phenomena of said particle formed of adsorbate particles and substrate particles (Misaka et al.: fig. 1, # 15; fig. 5 - Baumann et al.: pg. 4.4.1).

As per claim 13, this is concerned with an apparatus as in claim 12, wherein the input device is a display (this is standard with respect to particle simulators in general. I have personally done this as it pertains to Monte Carlo simulations).

As per claim 14, this is concerned with an apparatus as in claim 12, further comprising a display which displays the information set by the kinetic condition setting unit (this is standard with respect to particle simulators in general. I have personally done this as it pertains to Monte Carlo simulations).

As per claim 15, this is concerned with an apparatus as in claim 14, wherein the display shows the adsorbate particles generated by the particle motion computing unit and indicates the motion computed by the particle motion computing unit (this is standard in the art; I have seen this type of display at conferences [Official notice is taken that this feature was well known in the art at the time of the invention.).

As per claim 16, this is concerned with an apparatus for simulating phenomena of a particle formed of adsorbate particles and substrate particles, the apparatus comprising:

a kinetic condition setting unit (this is inherent in particle simulators such as monte Carlo simulators) **which sets information for defining kinetic conditions of the adsorbate particles** (Misaka et al.: figs. 1, 2, 5 ("calculate fluxes"); col. 2, lines 29-34 and 49-59; Baumann et al.: pg. 4.4.1) **wherein the information *can* include a position of a corresponding emission source, a temperature, a chemical composition of the particle, a region, a physical condition, a velocity of each atom forming the particle, and a direction** (Misaka et al.: abstract; figs. 1, 2, 5 ("calculate fluxes"); col. 2, lines 29-34 and 49-64; col. 3, lines 3-68; col. 4, lines 1-6; Baumann et al.: temperatue: fig. 6]; inherent on pg. 4.4.1); **and**

a particle motion computing unit which generates the adsorbate particles in accordance with the information set by the kinetic condition setting unit and the position of the corresponding emission source and computes motion of the generated adsorbate particles, to simulate phenomena of said particle formed of adsorbate particles and substrate particles, each adsorbate particle having a corresponding emission source (again, this is inherent in particle simulators such as Monte Carlo simulators; Misaka et al.: abstract; fig. 1, 2 col. 2 lines 49-59 and 59-64; col. 3, lines 3-68; col. 4, lines 1-6; Baumann et al.: pg. 4.4.1).

As per claim 17, this is concerned with an apparatus as in claim 16, wherein

the adsorbate particles move towards the substrate particles (Misaka et al. - fig. 1, 2, 3b; Baumann et al.: fig. 1),

the kinetic condition setting unit sets a region for defining an initial position of the adsorbate particles (Misaka et al.: figs. 1, 5; Baumann et al.: inherent on pg. 4.4.1),

the apparatus further comprises a display which displays the relationship between the region set by the kinetic condition setting unit and a region indicating a position of a substrate particle forming said particle formed of adsorbate particles and substrate particles (this is standard in the art; I have seen this type of display at conferences [Official notice is taken that this feature was well known in the art at the time of the invention.]).

As per claim 18, this is concerned with an apparatus as in claim 17, wherein

the kinetic condition setting unit sets information for providing a direction of velocity to the adsorbate particles (Misaka et al.: fig. 1 # 15; Baumann et al.: inherent on pg. 4.4.1), **and**

the display shows the direction of velocity with respect to the region set by the kinetic condition setting unit and the region indicating the position of a respective substrate particle (this is standard in the art; I have seen this type of display at conferences [Official notice is taken that this feature was well known in the art at the time of the invention.]).

As per claim 19, this is concerned with an apparatus as in claim 16, further comprising a display which displays the information set by the kinetic condition setting unit (this is standard with respect to particle simulators in general. I have personally done this as it pertains to Monte Carlo simulations).

As per claim 20, this is concerned with a computer-implemented method for simulating phenomena of a particle formed of adsorbate particles and substrate particles, each adsorbate particles having a corresponding emission source, the method comprising the steps of:

setting information for defining a plurality of generation periods and a corresponding number of adsorbate particles to be generated during each generation period (Misaka et al.: fig. 1, # 15; Baumann et al.: inherent on pg. 4.4.1) **wherein the information *can* include a position of a corresponding emission source, a temperature, a chemical composition of the particle, a region, a physical condition, a velocity of each atom forming the particle, and a direction** (Misaka et al.: abstract; figs. 1, 2, 5 ("calculate fluxes"); col. 2, lines 29-34 and 49-64; col. 3, lines 3-68; col. 4, lines 1-6; Baumann et al.: temperatue: fig. 6]; inherent on pg. 4.4.1);

generating the adsorbate particles in accordance with the information set in the setting step and the position of the corresponding emission source (Misaka et al.: fig. 1, # 15; Baumann et al.: inherent on pg. 4.4.1),

computing motion of the generated adsorbate particle, and simulating phenomena of said particle formed of adsorbate particles and substrate particles

in accordance with the computed motion (again, this is inherent in particle simulators such as Monte Carlo simulators, Misaka et al.: abstract; fig. 1, 2; col. 2 lines 49-59 and 59-64; col. 3, lines 3-68; col. 4, lines 1-6; Baumann et al.: pg. 4.4.1).

As per claim 22, this is concerned with a computer-implemented method for simulating phenomena of a particle formed of adsorbate particles and substrate particles, each adsorbate particle having a corresponding emission source, the method comprising the steps of:

setting, for each adsorbate particle, a region indicating a position of the corresponding emission source (this is standard with respect to particle simulators in general. I have seen done this as it pertains to Monte Carlo simulation [specifying the position of the cathode which is to eject electrons]; Misaka et al.: figs, 1, 5, 7, 8b, 9, 10; Baumann et al.: inherent on pg. 4.4.1),

generating the adsorbate particles in accordance with the position of the corresponding emission source as indicated by the region set in the setting step (Misaka et al.: fig. 1, # 15; Baumann et al.: inherent on pg. 4.4.1);

computing motion of the generated adsorbate particles, to simulate phenomena of the combined particle (Misaka et al.: fig. 1, # 15; Baumann et al.: pg. 4.4. 1); and

simulating phenomena of said particle formed of adsorbate particles and substrate particles in accordance with the computed motion (Misaka et al.: fig. 1, # 15; Baumann et al.: pg. 4.4. 1).

As per claim 23, this is concerned with a method for simulating phenomena of a particle formed of adsorbate particles and substrate particles, each adsorbate particle having a corresponding emission source, the method comprising:

setting information for defining kinetic conditions of the adsorbate particles wherein the information *can* include a position of a corresponding emission source, a temperature, a chemical composition of the particle, a region, a physical condition, a velocity of each atom forming the particle, and a direction (Misaka et al.: abstract; figs. 1, 2, 5 ("calculate fluxes"); col. 2, lines 29-34 and 49-64; col. 3, lines 3-68; col. 4, lines 1-6; Baumann et al.: temperatue: fig. 6]; inherent on pg. 4.4.1);

displaying the set information (Misaka et al.: figs. 1, 2, 5 ("calculate fluxes"); col. 2, lines 29-34 and 49-59; Baumann et al.: inherent on pg. 4.4.1);

generating the adsorbate particles in accordance with the set information and the positions of the corresponding emission sources (again, this is inherent in particle simulators such as Monte Carlo simulators; Misaka et al.: abstract; fig. 1,2; col. 2 lines 49-59 and 59-64; col. 3, lines 3-68; col. 4, lines 1-6; Baumann et al.: inherent on pg. 4.4.1); and

computing motion of the generated adsorbate particles, to simulate phenomena of said particle formed of adsorbate particles and substrate particles, each adsorbate particle having a corresponding emission source (again, this is inherent in particle simulators such as Monte Carlo simulators; Misaka et al.: abstract;

fig. 1, 2; col. 2 lines 49-59 and 59-64; col. 3, lines 3-68; col. 4, lines 1-6; Baumann et al.: pg. 4.4.1).

As per claim 24, this is concerned with an apparatus for simulating phenomena of a particle formed with adsorbate particles, comprising:

a kinetic condition setting unit (this is inherent in particle simulators such as monte Carlo simulators) **which sets information for defining kinetic conditions of the adsorbate particles** (Misaka et al.: figs. 1, 2, 5 ("calculate fluxes"); col. 2, lines 29-34 and 49-59; Baumann et al.: inherent on pg. 4.4.1) **wherein the information *can* include a position of a corresponding emission source, a temperature, a chemical composition of the particle, a region, a physical condition, a velocity of each atom forming the particle, and a direction** (Misaka et al.: abstract; figs. 1, 2, 5 ("calculate fluxes"); col. 2, lines 29-34 and 49-64; col. 3, lines 3-68; col. 4, lines 1-6; Baumann et al.: temperatue: fig. 6]; inherent on pg. 4.4.1), and

a particle motion computing unit which generates the adsorbate particles in accordance with the information set by the kinetic condition setting unit and computes motion of the generated adsorbate particles, to simulate phenomena of said particle formed with adsorbate particles, each adsorbate particle having a corresponding emission source (again, this is inherent in particle simulators such as Monte Carlo simulators; Misaka et al.: abstract; fig. 1,2; col. 2 lines 49-59 and 59-64; col. 3, lines 3-68; col. 4, lines 1-6; Baumann et al.: pg. 4.4.1); **wherein**

for each adsorbate particle, the kinetic condition setting unit sets a region indicating a position of the corresponding emission source (Misaka et al.: fig. 1, # 15; also inherent in figs. 2, 7, 8b, 10; Baumann et al.: inherent on pg. 4.4.1), **and**

the particle motion computing unit generates each adsorbate particle in accordance with the position of the corresponding emission source as indicated by the region set by the kinetic condition setting unit (Misaka et al.: fig. 1, # 15; Baumann et al.: pg. 4.4.1).

As per claim 25, this is concerned with an apparatus as in claim 24, wherein the information set by the kinetic condition setting unit (this is inherent in particle simulators such as Monte Carlo simulators) **defines a plurality of generation periods and a corresponding number of adsorbate particles to be generated during each generation period by the particle motion computing unit** (Misaka et al.: figs. 1, 2, 5 ("calculate fluxes"); col. 2, lines 29-34 and 49-59; Baumann et al.: inherent on pg. 4.4.1).

As per claim 26, this is concerned with an apparatus as in claim 24, wherein said particle formed with adsorbate particles is formed with both adsorbate particles and substrate particles,

the information set by the kinetic condition setting unit includes information for defining kinetic conditions of the substrate particles (Misaka et al.: figs. 1, 2, 5 ("calculate fluxes"); col. 2, lines 29-34 and 49-59; Baumann et al.: inherent on pg. 4.4.1); **and**

the particle motion computing unit generates the substrate particles before generating the adsorbate particles (this would seem to be obvious; why generate particles which are to interact with a target if the target is not there; Misaka et al.: figs. 1, 2, 4, 5, 7, 8b, 9, 10; Baumann et al.: pg. 4.4.1).

As per claim 27, this is concerned with an apparatus as in claim 24, wherein

said particle with adsorbate particles is is formed with both adsorbate particles and substrate particles,

each substrate particle includes a fixed particle and a temperature control particle (Baumann et al.: temperatue: fig. 6]),

the information set by the kinetic condition setting unit includes information for defining kinetic conditions of the fixed particle and the temperature control particle (Misaka et al.: figs. 1, 2, 5 ("calculate fluxes"); col. 2, lines 29-34 and 49-59; Baumann et al.: inherent on pg. 4.4.1), **and**

the particle motion computing unit generates the fixed particle and the temperature control particle of each substrate particle in accordance with the information set by the kinetic condition setting unit (again, this is inherent in particle simulators such as Monte Carlo simulators; Misaka et al.: abstract; fig. 1,2; col. 2 lines 49-59 and 59-64; col. 3, lines 3-68; col. 4, lines 1-6; Baumann et al.: inherent on pg. 4.4.1).

As per claim 28, this is concerned with an apparatus as in claim 24, further comprising a display which displays the information set by the kinetic condition

setting unit (this is standard with respect to particle simulators in general. I have personally done this as it pertains to Monte Carlo simulations).

As per claim 29, this is concerned with an apparatus as in claim 24, wherein each adsorbate particle includes a plurality of atoms (Misaka et al.: fig. 1 ("radical"), fig. 2, fig. 4 (b,c,d); Baumann et al. fig. 1);

the information set by the kinetic condition setting unit includes information indicating whether the atoms of a respective adsorbate particle are static against center of mass of the adsorbate particle (inherent in simulation of clusters); **and**

when the particle motion computing unit generates an adsorbate article and the information set by the kinetic condition setting unit indicates that the atoms of the respective adsorbate particle are not static against center of mass, the particle motion computing unit provides a random orientation to the atoms of the adsorbate particle (Official notice is taken that this physical phenomena and approximations so as to take it into account in simulations were well known in the art at the time of the invention. [see for example studies of ion attachment to electrodes submersed in salt solutions, studies of nucleation, or the motion of electrons around moving atoms or molecules]).

As per claim 30, this is concerned with an apparatus as in claim 29, wherein, when the particle motion computing unit generates an adsorbate particle and the information set by the kinetic condition setting unit indicates that the atoms of the respective adsorbate particle are not fixed against center of mass,

the particle motion computing unit provides an initial velocity to the atoms of the adsorbate particle (Official notice is taken that this physical phenomena and approximations so as to take it into account in simulations were well known in the art at the time of the invention. [see for example studies of ion attachment to electrodes submersed in salt solutions, studies of nucleation, or the motion of electrons around moving atoms or molecules]).

As per claim 31, this is concerned with an apparatus as in claim 24, wherein, when generating an adsorbate particle, the particle motion computing unit provides a random direction within a cone pointed at a substrate and being centered at a point of generation of center of mass velocity of the adsorbate particle (Official notice is taken that this physical phenomena and approximations so as to take it into account in simulations were well known in the art at the time of the invention. [see for example studies of ion attachment to electrodes submersed in salt solutions, studies of nucleation, or the motion of electrons around moving atoms or molecules]).

Claims 1, 3-9, 11-20, 22-26 and 28-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over (Yamada et al. *or* Misaka et al. *or* Baumann et al. *or* Husinsky et al.) in view of (Kinema/SIM or Reeves or Cohen).

Yamada et al. discloses details of a Monte Carlo simulation of sputtering. See entire disclosure. Especially note fig. 1-3.

Misaka et al. disclose a dry-etching process simulator wherein a surface reaction model is used to simulate topological evolutions by taking into account the existence of

adsorbed radicals on the substrate surface. See figs. 1, 2, 3b, 4, 5 ("calculate fluxes"); col. 1, lines 35-68; col. 2, lines 29-34 and 49-59; col. 3, lines 16-68; col. 4, lines 50-65.

Baumann et al. disclose 3D modeling of sputtering using a mesoscopic hard-sphere Monte Carlo model. (see fig. 1 of Baumann et al.). Baumann et al. simulate the behavior of *clusters* as they interact with a substrate (note that the use of ion cluster beams and molecular beams for deposition and/or sputtering are well known techniques; this phenomena has also been simulated.). See pg. 4.4.1 and fig. 1-2.

Husinsky et al. disclose "*Fundamental aspects of SNMS for thin film characterization: Experimental studies and computer simulations.*" They further disclose that the idea of secondary neutral mass spectroscopy (SNMS) as a tool for surface analysis dates back to the early 1970s. Recently, due to the development of new and effective post ionization tools, i.e. lasers, this method has become an interesting alternative to more conventional methods for various applications in surface analysis, as for instance depth profiling or characterization of thin films. SNMS, in general, involves a more complicated apparatus than other techniques, due to the additional post-ionizing stage. However, in the last few years it has been demonstrated by many groups that for several situations SNMS offers substantial advantages as compared with conventional methods, in particular secondary ion mass spectrometry. In this paper they evaluate the current situation of SNMS, in particular laser-SNMS, for applications related to the field of thin film research. On behalf of experimental studies and ***computer simulations of various phenomena related to SNMS*** they show the possibilities, advantages and also problems associated with the method. See section 4 (sputtering) including section

4.1 (sputtered flux - fig. 4, 9 and 16 - showing combined particles); section 4.3 (computer simulation of sputtering) and section 4.4 (cluster emission).

(Yamada et al. *or* Misaka et al. *or* Baumann et al. *or* Husinsky et al.) discloses all claim limitations except for a teaching animation of the simulation. (Kinema/SIM *or* Reeves *or* Cohen) teach that it was obvious and well known to one of ordinary skill in the art at the time of the invention to animate simulations of physical processes. (Kinema/SIM *or* Reeves *or* Cohen) provide details about animations of particles. The teachings of (Kinema/SIM *or* Reeves *or* Cohen) are subsequently presented.

Kinema/SIM is a software tool that presents a simulation space for particle behavior where you can construct and animate complex physical phenomena. See entire disclosure. A number of features are subsequently listed for Applicant's benefit.

- Examples of the graphical interface are shown on pp. 1-8 to 1-9;

- the "particle window" is shown on pg. 2-7; here the particle parameters can be altered;

- "Lifetime" defines the particle lifetime (pg. 2-9);

- "particle geometry" is discussed on pg. 2-11;

- "coordinate systems" are discussed on pg. 3-3;

- entering particle parameter values via slider buttons (pg. 3-10;

- probibility functions for particle speed, lifetime, emission angles (pg. 3-11);

- other relevant temporal parameters (pg. 3-16);

- GUI simulation controls (pg. 5-2);

- statistical features (ie., *group behavior* - pg. 5-3);

- particles, obstacles (pg. 5-5);

- deatils about simulation parameter values including source rate, display, particle interactions and emission sources (chapter 6);

- range of interactions between particles (pg. 6-3);

- source rate (pg. 6-4);

- a combined particle (pg. 6-5), wherein

*"The Euler mode, on the other hand, calculates forces more globally and therefore has the advantage of maintaining simulation speed. It calculates only one force per cell at time t, which is applied to **all particles in the cell**. ... ",*

- Chapter 7 discloses "Particles";

- particle coupling (pg. 7-1);

- particle examples (pg. 7-1), wherein

"Particles are the key element in Kinema/SIM simulations. They are point objects that can represent a broad range of physical and image characteristics such as mass, charge, color, motion and geometry. In your simulation, particles can represent a diversity of real or image objects such as quantum physics particles, gas molecules, aerosol droplets, bacteria, fluid flow, dust, rain, snow, sand, or pixels of images. The possibilities are as numerous as the phenomena of reality and creative animtion ...

... Particles are emitted into the simulation via sources which can be visible or invisible points or geometric objects positioned in simulation space. ...";

- particles parameter window (pg. 7-3 to 7-4);

- *"Sigma", a parameter related to particle-particle interactions* (pp. 7-13 to 7-14);

- decay particles (pg. 7-21);

- particle coupling (pp. 7-22 to 7-23);

- Chapter 8 (source parameters);

- sources (pg. 8-1), wherein

"Sources are orgins that emit particles into the simulation, and all particles must enter the simulation via a source. Sources can be points or have spatial geometry which you can choose to see or hide in simulation space. You can define as many sources as you like for a system, but each source is restricted to emit only one particle type. (If you want to have more than one particle type originate from the same position, you can superimpose sources at the point. ...

... In the source window you assign a particle type to the source and then define the rate and speed of the particles along with their spread angle into the simulation. ... "

The "spread angle" is Applicant's "cone".;

- source window (pg. 8-3);

- source rate (pg. 8-4);

- **Spread** (pg. 8-5);

- speed (pg. 8-6);

- source position (pg. 8-10);

- display (pg. 8-11);

- geometry (pg. 8-13);

- particle emission and geometry (pp. 8-15 to 8-16);

- particle generation (pp. 8-16 to 8-17);

- Chapter 9 "Obstacles";

- Chapter 13, "electric fields";

- Chapter 15, "particle events";

- elastic and inelastic particle collisions (pp. 15-1 to 15-2);

Reeves discloses animation of particle behavior and discloses the concept of combined particle. On page 91,

"First, an object is represented not by a set of primitive surface elements, such as polygons or patches, that define its boundary, but as clouds of primitive particles that define its volume."

Section 2.1 discloses particle generation. Section 2.2 discloses:

"For each new particle generated, the particle system must determine values for the following attributes:

(1) initial position,

(2) initial velocity (both speed and direction),

(3) initial size,

(4) initial color,

(5) initial transparency,

(6) shape,

(7) lifetime.

Section 2.3 discloses particle dynamics.

Cohen discloses "*Computer animations, quantum mechanics and elementary particles.*" See entire disclosure. The following is from pg. 165;

"In a typical animation, starting from a small number of virtual particles, the number tends to increase as a function of time, signaling the deviation from the physical states. A physical particle contains a cloud of finite size of virtual particles. The animation actually allows us to see the formation of such clouds. It is rather amusing to identify dressed objects mainfesting collective behavior, and then analyze the space renormalization group of the clouds by zooming in."

On page 166, the following is found:

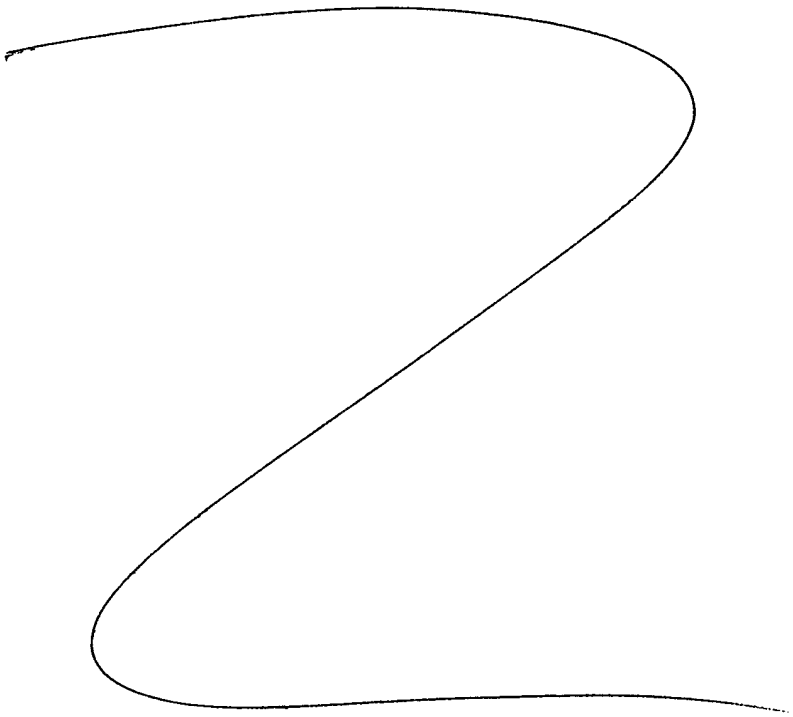
The visualization "dictionary" developed for computer animations of quantum systems ***can be applied to any process following the rules of one or several of Nature's fundamental interactions. Animation of***

various atomic and subatomic phenomena *such as electron orbitals, particle collisions, radiactive decay, fusion, fission, etc. are therefore feasible and instructive."*

Claims 1, 3-9, 11-20 and 22-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over [Ohira et al. (Applicant - Applicant's IDS).] in view of (Kinema/SIM *or* Reeves *or* Cohen).

Ohira et al. discloses details of a Molecular-dynamics simulation of sputtering. See: abstract; pg. 2 (Theoretical Methods) and especially fig. 1.

[Ohira et al.] discloses all claim limitations (**see fig. 1 - temperature control particles**) except for a teaching of animation of the simulation. (Kinema/SIM *or* Reeves *or* Cohen) teach that it was obvious and well known to one of ordinary skill in the art at the time of the invention to animate simulations of physical processes. (Kinema/SIM *or* Reeves *or* Cohen) provide details about animations of particles. The teachings of (Kinema/SIM *or* Reeves *or* Cohen) were presented earlier.



***(11j) Response to Argument – Conclusion* (pg. 17, Appeal Brief)**

In concluding remarks, Appellants state that for reasons set forth, that the claims patentably distinguish over the prior art of record. In fact, Appellants have not argued the patentability of the claims over the prior art; instead, Appellants have attempted to variously argue that the prior art rejections were somehow deficient or that they are now "not sure if they have the correct version of the art". This is in spite of the fact that 1) Appellants appear to acknowledge that the claims have been examined in so far as they are appealing the rejections, and 2) Appellants have been arguing the rejections since 2/1999; although they do not at this important stage in the prosecution.

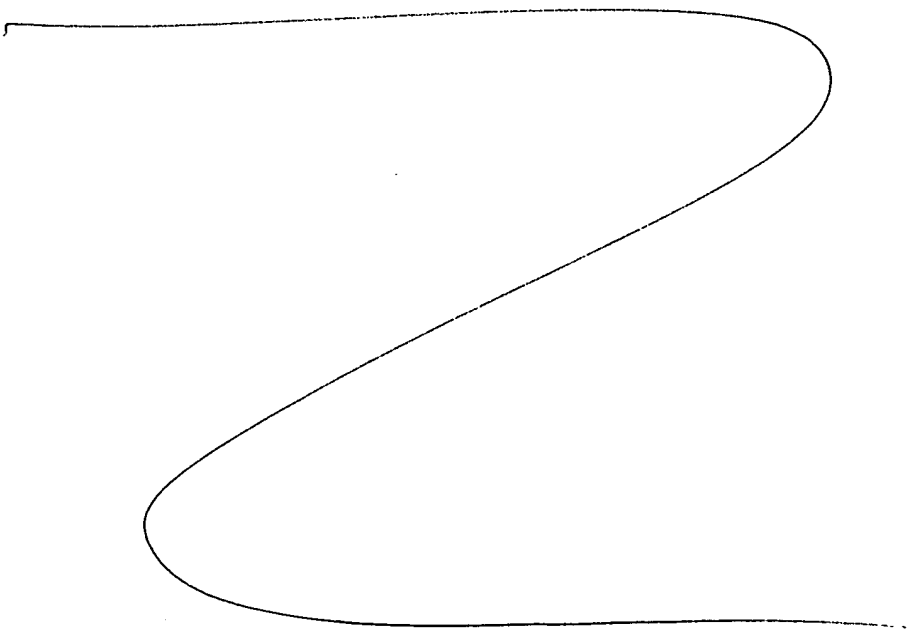
The Examiner, respectfully, has expended a great deal of effort over the years to provide Appellants with a comprehensive and detailed examination. In general, during the past five years of prosecution, Appellants have not even attempted to address the merits of the rejections other then generally mischaracterizing, throughout prosecution, the prior art in spite of repeated attempts by the Examiner to correct the record. Appellants have also ignored responses by the Examiner to allegations made by Appellants. Now at this late stage in the prosecution, Appellants allege that the rejections are deficient.

The Examiner would also like to point out that reasonable "inferences", and "common sense" may be considered in formulating rejections for obviousness. Specifically, *In re Preda*, 401 F.2d 825, 159 USPQ 342, 344 (CCPA 1968) states "in considering the disclosure of a reference, it is proper to take into account not only specific teachings of the reference but also the inferences which one skilled in the art

would reasonably be expected to draw therefrom." Also, *In re Bozek*, 416 F.2d 738, 163 USPQ 545, 549 (CCPA 1969) states that obviousness may be concluded from "common knowledge and common sense of the person of ordinary skill in the art without any specific hint or suggestion in a particular reference". Additionally, see *In re Gauerke*, 24 CCPA 725, 86 F.2d 330, 31 USPQ 330, 333 (CCPA 1936), and *In re Libby*, 45 CCPA 944, 255 F.2d 412, 118 USPQ 94, 96 (CCPA 1958), and *In re Jacoby*, 309 F.2d 738, 125 USPQ 317, 319 (CCPA 1962), and *In re Wiggins*, 488 F.2d 538, 543, 1979 USPQ 421, 424 (CCPA 1973).

Lastly, the Board is cordially invited to review the record to determine whether Appellants' characterization of the Examiner is accurate.

For the above reasons, it is believed that the rejections should be sustained.



Respectfully submitted,

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